

# Consulting Engineer



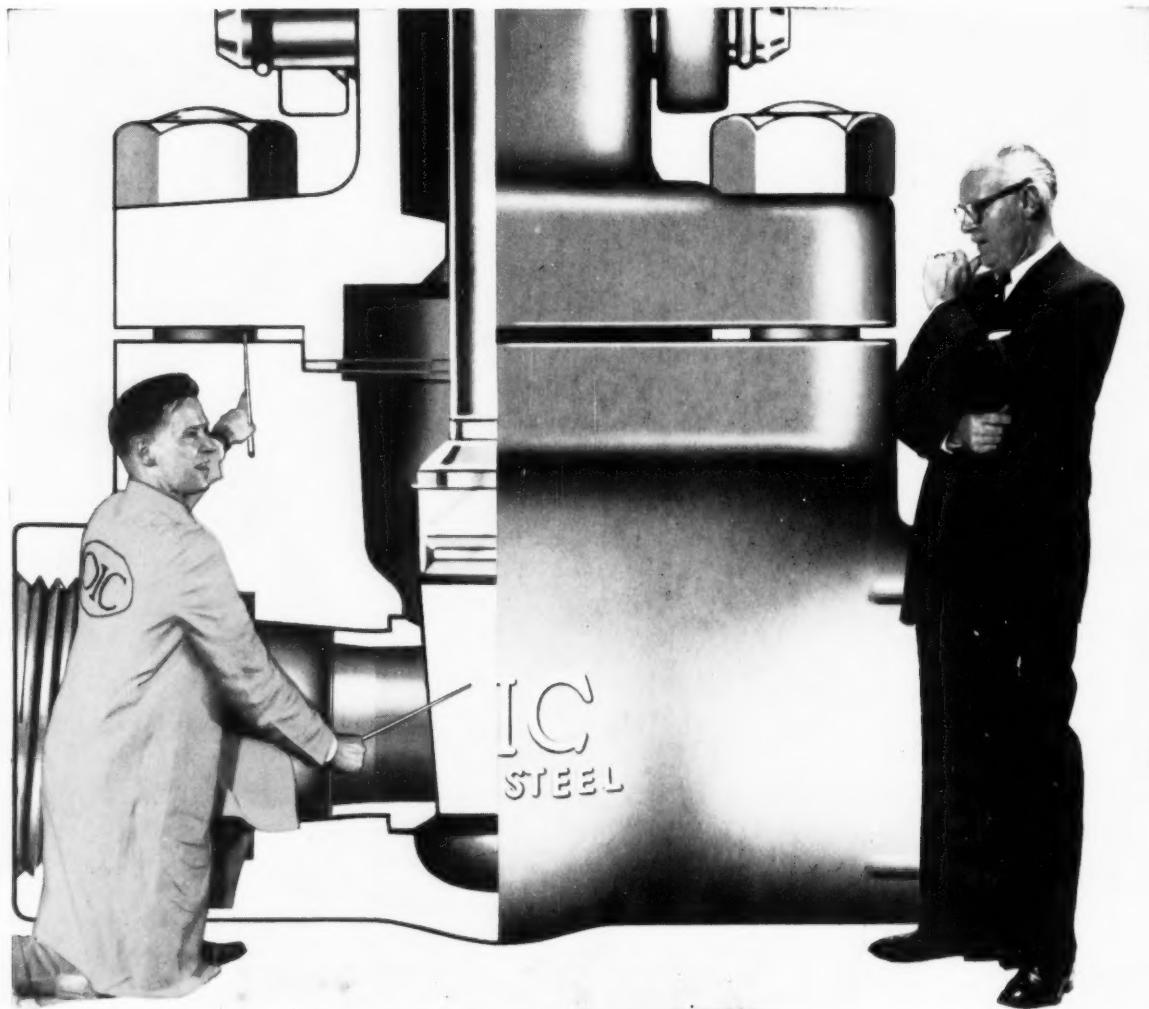
February, 1958



MILO S. KETCHUM, senior partner in the firm of Ketchum & Konkel, structural engineers, of Denver, Colorado, is best known for his thin shell concrete designs. He is recognized not only in this country but abroad as among the foremost of the small group of engineers who fully understand

*Continued on page 8*

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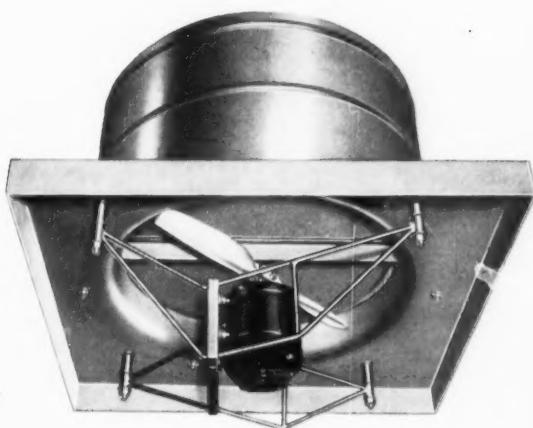
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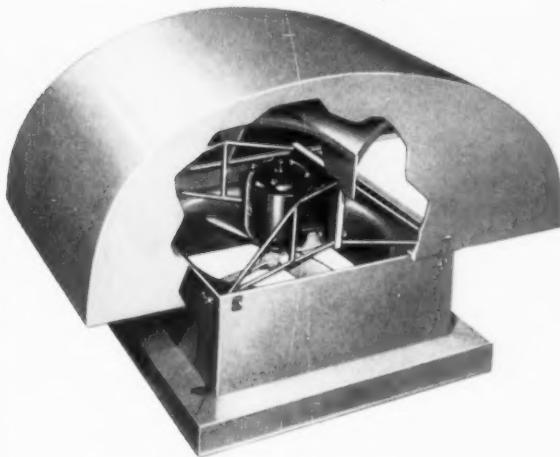
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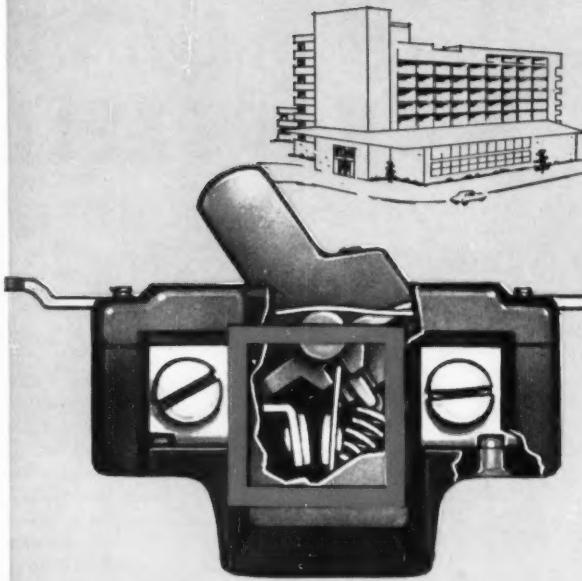
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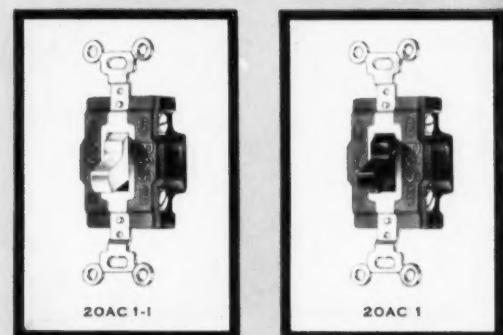
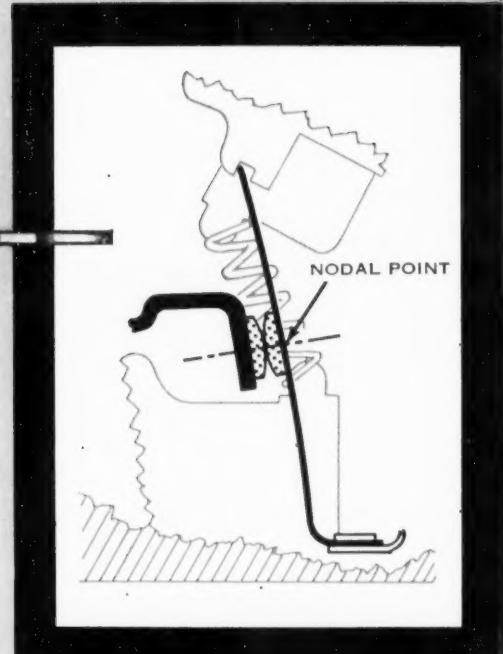


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The Consulting Engineer's Professional Magazine

Wayne near Pleasant Street  
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February, 1958 • VOLUME X • NUMBER II

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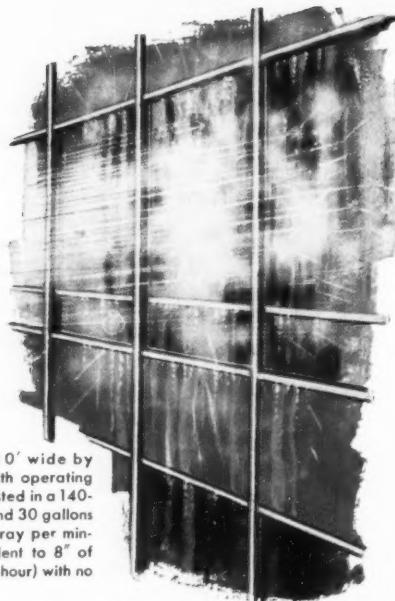
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## New Versatile-Wall offers weather-

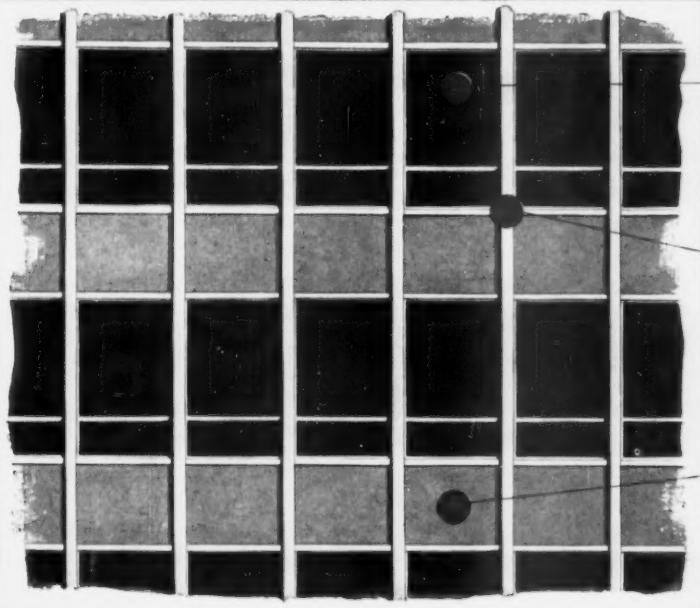


A section 10' wide by 14' high with operating sash was tested in a 140-mile wind and 30 gallons of water spray per minute (equivalent to 8" of rainfall per hour) with no leakage.

With Robertson Versatile Wall, architects and engineers can enjoy full freedom of expression in the use of modular units and colors and still be sure of the precision of fit necessary to resist the ravages of weather. Developed after years of experience, research and testing, this curtain-wall system combines the advantages of standard units with the artistic latitude of tailor-made walls.

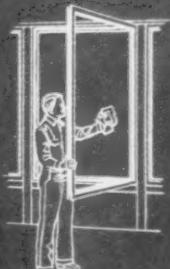
The results of extremely severe tests proved beyond a doubt that the rugged, weathertight construction of Robertson Versatile Wall can more than withstand the devastating forces of hurricanes and tornadoes. Units are designed to expand and contract to take care of building movement and steel framing tolerances without loss of tight seal. Yet infinite design variety is available. Verticals can be made with a variety of sizes and shapes in stainless steel, aluminum, bronze or porcelain enameled metal. Spandrels also can be designed in a great variety of colors and textures.

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Exclusive new side hinged inswinging windows make cleaning easier and safer, and seal positively when locked. There is no interference from pivot pins if hopper is used below, and the entire window can be removed in minutes for easy shop reglazing.



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Though any type of window can be specified, there are many advantages to the new Robertson V-Window. Hinged at the side, it swings into the room for safer and easier cleaning, plus a more positive seal than possible with a pivoted window. An ingenious hinge allows the window to be removed and replaced with a spare, so that any reglazing can be done in the shop. Moreover, when a hopper window is specified underneath, weight is better distributed on the sill, and it is not necessary to accommodate pivots.

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## Milo S. Ketchum

—Starts on front cover

and appreciate this type of construction. His firm has done the structural engineering for thin shell industrial plants, commercial buildings, shopping centers, schools, clubs, and hotels.

The firm was founded by Ketchum in 1945, with E. Vernon Konkel becoming a partner in 1954. At present there is a staff of 18 engineers in addition to the principals. Since the firm's inception, more than 1600 projects have been completed, ranging from one hour consultation to complete structural plans for multimillion dollar projects.

Milo Ketchum, born in Denver, got his bachelors and masters degrees in civil engineering from the University of Illinois where his father was Dean of Engineering. Ketchum, himself, taught at Case School of Applied Science, Cleveland, Ohio, from 1937 until 1943, leaving that school to join a firm in private practice in Marion, Ohio. Then, two years later, he opened his own office, in Denver.

During this period he has taken time from his practice to study and write, which effort has resulted in many magazine articles and a book, *Handbook of Standard Structural Details for Buildings*. He says, "The reason one writes is not because one knows everything about a subject, but because one wants to learn, and writing is the best way to accomplish this."

### Architect-Structural Engineer Relations

Milo Ketchum is a conscientious student of the problems involved in the architect-structural engineer relationship.

"The structural engineer is in a position different from that of other engineers who have architects for clients. For example, the great majority of architects do not employ mechanical or electrical engineers in their own offices. They generally are willing to engage outside firms of mechanical or electrical engineers to handle the design and specification of equipment, but many feel that the work of the structural engineer is so closely related to architecture that it should be handled in their own offices. It is not at all uncommon to find a structural engineer working as an employee in an architect's office. He is not infrequently referred to as a 'beam sizer.' As a result, we find that while most mechanical and electrical engineers are competing against each other for work, the consulting structural engineers are competing largely against engineers in their clients' own offices.

"Good architects are getting over the notion that they must leave the owner with the idea that they do the whole job. They now are willing to admit — perhaps brag — about their use of good mechanical and electrical engineers on their projects. But even today, all too many architects hide their structural

engineers. Perhaps they are afraid owners might think they had nothing to do if they confessed that an outside engineer did the structural design.

"This would suggest that most owners and even a few architects do not know the difference between architecture and structural engineering. It is going to have to be understood that the architect is a creator of form, an artist, an esthete who understands form and the function of space and provides the over-all coordination. The structural engineer must take the architect's initial concept, must assist him in selecting a suitable structure, and then he must apply to it the laws of structural mechanics, changing an esthetic idea into a stable design — described in drawings the contractor can read.

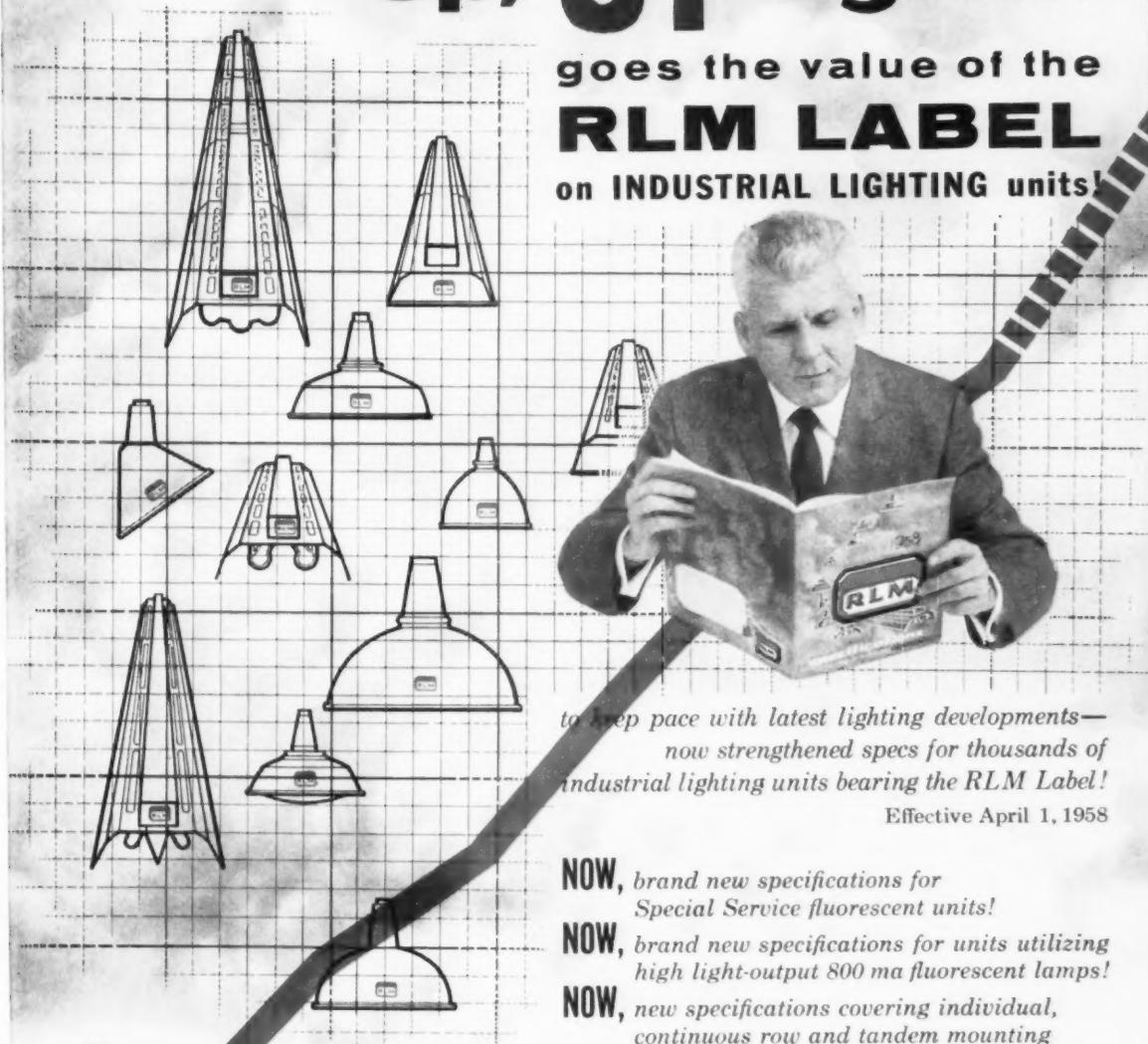
"Let's take a practical example. An architect is asked to design an auditorium. His final concept takes form as a structure shaped like half a pear that has been split through the stem. He has decided that this is a functional shape, that this will best suit requirements of form and space. With this the architect now has completed the general architectural design, and the owner has no logical reason to think that the man who was able to conceive of this form also must be able to calculate the position and size of the structural steel or specify the thickness and reinforcing of the concrete. The world is not full of men both talented as artists and skilled in the computation of problems in static mechanics and strength of materials. Two different types of minds and two different types of training and experience are required. It should not be hard to explain this to an owner.

"Structural engineers in private practice have an additional problem. They must compete with the employee engineer in the architect's office. Therefore, it is imperative that they do a much better job from all points of view.

"Our work must be outstandingly excellent so that the architect who uses our service can have no doubt but that they are thereby best serving their clients and saving themselves money. A good structural firm need not find it difficult to convince an intelligent architect. When an architect hires his own engineer on an employee basis, he has no way to be sure of the quality of the work his employee turns out. Furthermore, the average architectural office could not afford to hire more than one or at the most two structural engineers, and it is likely that they would employ men willing to work for average engineer salaries. Ambitious young engineers may not want to work for an architectural firm because of the difficulty of using such experience as qualification for registration. If they pay \$8000 a year to their employee engineer, they are going to get \$8000 work and experience. They can expect no more. On the other hand, if they go to a firm of consulting structural engineers, they can get engineering done by men who may earn as much

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each year as the architect himself. In fact, the structural firm might have an engineering payroll of several hundred thousand dollars a year, and the architect who used this firm would get the benefit of all this talent and experience.

"There are other good reasons for using a firm of structural engineers. The work in an architectural office is seldom steady. An architect may have ten jobs in his office and a month later he may have ten times — or one-tenth — that many. If he has an employee structural engineer, the man will have more than he can possibly do part of the year and nearly nothing to do for the rest. Obviously, this is more expensive than calling upon a structural consultant and paying him in accordance with the work assigned him. With our 18 men, for example, we can put as many as we need onto any job and get it out on schedule. No architect could match that with the one or two engineers he might have in his own office. Then, too, we work with many architects on many types of jobs, and our range of experience is bound to be much greater than that of an employee confined to one office and restricted to association with one architect — his boss.

"Architects (and their clients) need not worry about architects not having enough to do. Not only is the creation of a design concept a major job in itself, but the architect is expected to act as the coordinator of all the other professions on many types of work. On commercial buildings, schools, churches, institutions, and almost all building projects except heavy industrial, the architect is usually the professional man dealing directly with the owner. He must bring the structural, mechanical, and electrical engineers together and see to it that they coordinate their efforts and fit all into his spatial and form concept. Most architects have ability to do that phase of the job.

"Unfortunately, too many architects seem to think that they have been hired to keep their clients away from the engineers. They act as ambassadors, or messenger boys, depending upon the way you look at it, when they should be bringing all parties together. Not being engineers themselves, they often have a hard time trying to explain the engineers' ideas to the client. If they would bring the engineers and the clients together early in the planning, they could save time and money and get the client something closer to what he wants.

"While it is right that the architect should be in charge of projects that are predominantly architectural in nature, it is wrong for architects to try to handle general supervision of engineering undertakings. For example, it is silly for the architect to be the prime professional on a new generating station. This should have a mechanical or electrical engineer in charge, and the architect should be under him. There are many instances in which the structural engineer should be the prime profes-

*Announcing the*

# ALFRED A. RAYMOND AWARD



An award of \$1,000 will be given annually in honor of Alfred A. Raymond, inventor of the cast-in-place concrete pile and founder of Raymond Concrete Pile Company. It will be presented to the author of the best original paper on "Design and Construction of Foundations for Structures," as selected by a committee of eminent judges. Authors of manuscripts, to qualify, must hold a degree in engineering from an accredited institution.

The topic "Design and Construction of Foundations for Structures" is to be interpreted broadly. It covers all phases of foundation engineering from the initial planning to the final installation of a foundation for a structure. Engineers are cordially invited to submit a paper on whatever aspect of foundation engineering or construction of foundations will contribute to knowledge in the field. Manuscripts may deal with foundation test borings, soil mechanics, the theory of foundation design, actual foundation construction, either temporary or permanent, and other related subjects. All paper's must be submitted by September 1, 1958.

If you are a practicing engineer, engineering faculty member or a graduate student and wish to compete for this award, simply write for a complete set of detailed regulations: Dept. O., Alfred A. Raymond Award, Room 1214, 140 Cedar Street, New York 6, N. Y.

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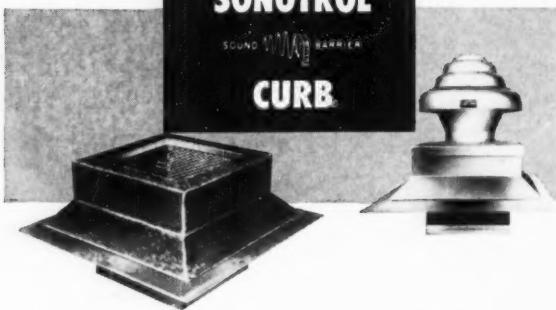
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sional — on a project for erection of tanks, bins, or elevators, for example. It seems logical to us that the prime professional in every instance should be the man representing the profession spending most of the money on the job.

"This would mean that on many industrial buildings the mechanical or the electrical engineer would be in general charge. On some industrial buildings, particularly warehouses or other buildings of that nature, the structural engineer would be in charge, and on all other buildings, the architect would be the coordinator of the professions. Nothing could be less logical than to have a structure involving 10 percent architectural costs and 90 percent engineering, designed and built under the supervision of an architect. I also would agree that no engineer should try to control a job that is architectural in nature. Few architects, however, have this point of view and may resent the structural engineer who entertains such notions.

"The engineer should not try to handle alone all the problems of engineer-architect relations. If the engineer 'doth protest too much,' he may find himself without clients. The difficult problems in engineer-architect relations are best handled by organized bodies from both professions — the AIA for the architects, and engineer associations for the engineers. That is one of the reasons we started the Structural Engineers Association of Colorado here five years ago. We did not, at first, have mechanical or electrical engineers in our group because we felt that our principal problems were somewhat different from theirs, and we had a certain amount of housecleaning to do ourselves.

"This association has since its inception adopted some policies which I consider to be very wise. Our dues are a minimum (two dollars if you miss a meeting). All the structural engineers are invited to belong no matter how long they have been in business. We discuss fees but do not have a fee schedule. We recognize that an engineer starting out by himself must cut his fees, but once he starts hiring employees he will charge normal fees.

"Later a group of all engineers was formed called 'the Consulting Engineers Association of Colorado' which, in turn, became a charter member of the national Consulting Engineers Council.

"Our association work has paid off here in Colorado. All the engineers know each other, our relations with architects are good, and there is scarcely an architect in the area who does not make full use of consulting structural engineers. I understand that this is not true all over this country. In some areas it seems to be common practice for architects to use employee engineers. That can be changed only by a full explanation to the architect and his client of the advantages of an independent consultant for structural work. That takes time, but I feel sure it can be done."

Hampton Roads Bridge-Tunnel  
is Powered-Up  
by Westinghouse

YOU CAN BE SURE...IF IT'S  
Westinghouse 

# Hampton Roads Bridge-Tunnel Links Virginia Peninsula with Norfolk

## Westinghouse Electrical Equipment is Used Throughout

The bridge-tunnel recently opened across Hampton Roads, between Newport News and Norfolk, Virginia, features many "firsts" in engineering and construction. Among the most interesting of these are the specially engineered uses of electrical power for illumination, ventilation and other required services.

Both bridge and land approaches to the new 7,479-foot portal-to-portal tunnel are lighted with Westinghouse OV-20 mercury vapor luminaires, controlled from the central control panel. The interior of the tunnel is lighted with special Westinghouse fluorescent luminaires—employing enough fluorescent tubes to provide a single uninterrupted light line three miles long. Double rows of these fixtures provide high-intensity lighting at the tunnel portals, while the central portion of the tunnel uses a single row of lights on each side. Lighting intensities at both tunnel openings are controlled in relation to the daylight or darkness outside,

so no abrupt visual adjustments to varying light conditions are required when entering or leaving tunnel. Special Westinghouse saturable reactors and controls were developed to provide this important lighting technique. The entire length of tunnel is so well illuminated that motorists will be able to switch off their lights while driving through it.

Special Westinghouse equipment controls sixteen vane-axial ventilating fans, eight at each end of tunnel, with a total circulating capacity of 3,408,000 cubic feet of air per minute. Eight fans supply fresh air to tunnel while the other eight exhaust contaminated air. Pitch of fan blades is variable and remotely controlled to permit accurate regulation of air volume handled by each fan. All fan operation is coordinated and controlled at central control board where four carbon monoxide recorders provide a constant check on the concentration of this gas throughout entire length of tunnel.

The entire electrical power requirement of tunnel

(cont'd)

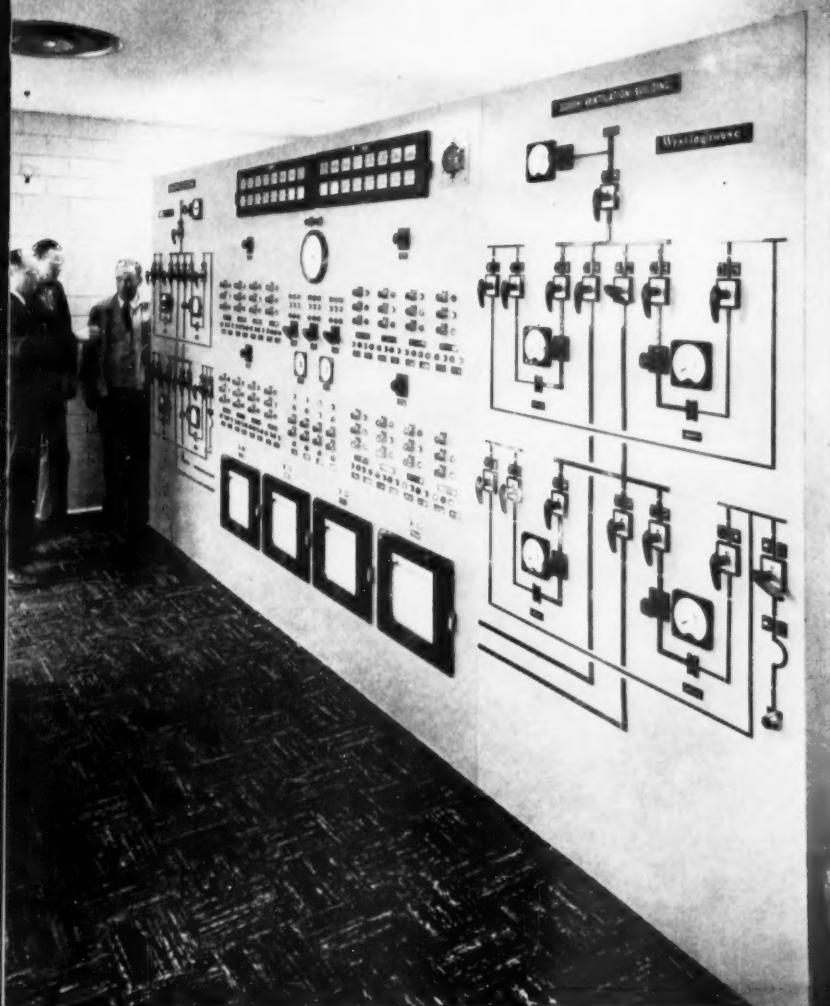


Tunnel is lighted with special Westinghouse fluorescent luminaires installed in protective tubes of pyrex glass. Special bronze fixtures were provided by Westinghouse to mount lights and protective tubes and to facilitate cleaning and replacement.



Intensities of tunnel lighting are varied by means of saturable reactors. Also included in installation are lighting supply transformers and constant current regulators to control bridge and approach lighting. View of transformer room shows John L. Taylor of E. C. Ernst, Inc., Electrical Subcontractors and Engineers, and William G. Phillips, Westinghouse Service Engineer.

J-94089-2



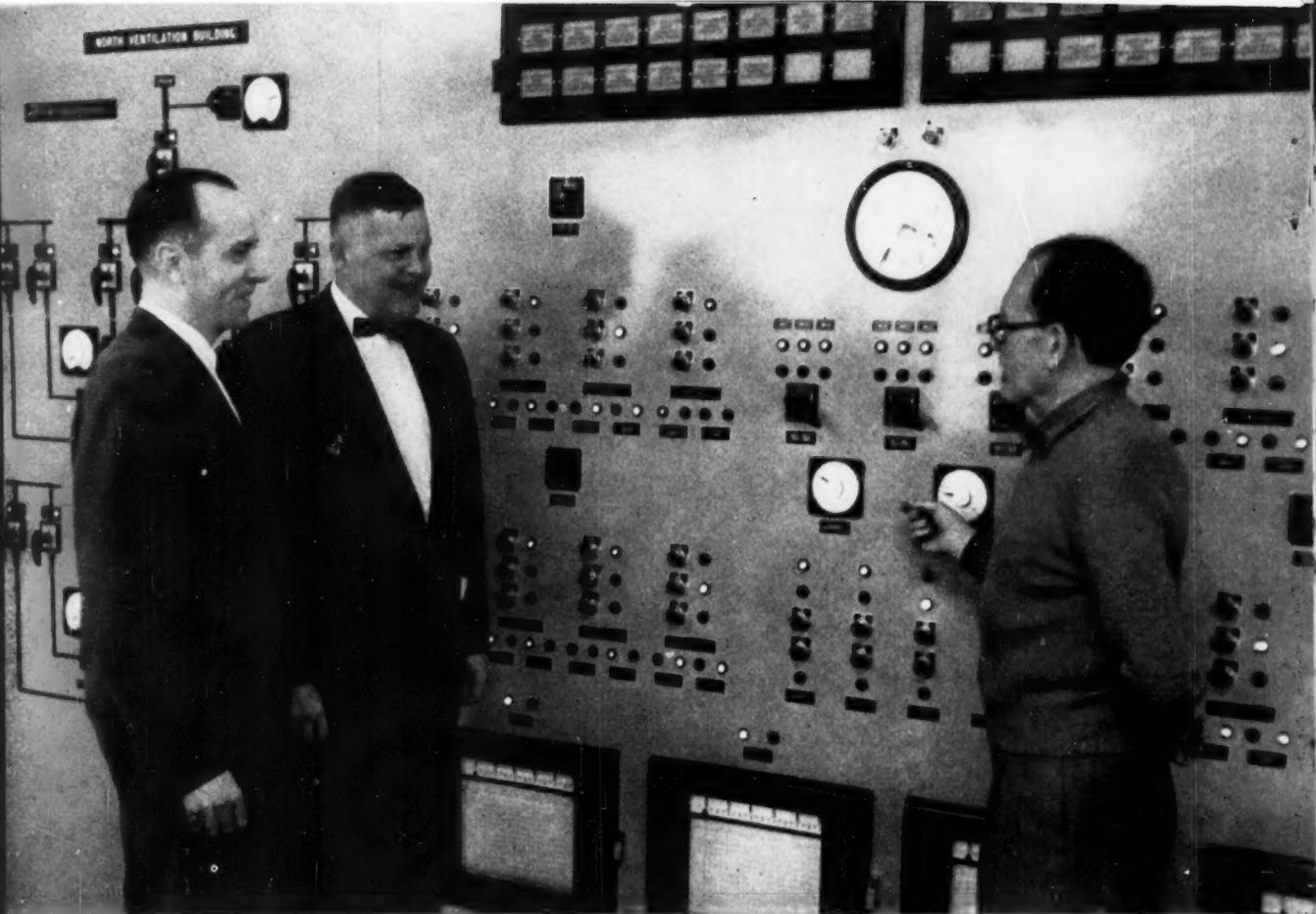
A Westinghouse special master tunnel control board allows operator to supervise tunnel operation from central point. Both tunnel illumination and ventilation are controlled from this board. Ventilating rates can be adjusted by varying number of supply and exhaust fans in operation and by changing fan speed and blade pitch to increase or decrease fan capacities. Also incorporated are alarm indicators, carbon monoxide recorders, time switches and other indicating and control devices. M. B. Trimble, Westinghouse Construction Sales Engineer; James McMahan, Bridge-Tunnel Superintendent, Virginia Department of Highways; and Harry D. Mahoney, Engineer, Parsons, Brinckerhoff, Hall and Macdonald, Consulting Engineers, discuss control board.



Westinghouse double-ended power centers utilize 1000-kva Inerteen®-immersed power transformers. Incoming power service enters metal-clad switchgear located between step-down transformers. Close-coupled to transformer secondaries are low-voltage switchgear assemblies, special fan control cubicles and control centers for tunnel auxiliaries.

J-94089-3

**YOU CAN BE SURE...IF IT'S**  
**Westinghouse**



Close-up of center of tunnel control board shows M. B. Trimble, Westinghouse Construction Sales Engineer, with Maurice N. Quade and J. O. Bickel of Parsons, Brinckerhoff, Hall and Macdonald, Consulting Engineers, Designers and Supervisors.

is supplied through four identical Westinghouse 2000-kva power centers, two in each ventilation building on man-made islands at each end of tunnel.

This is another example of how Westinghouse can help engineers and contractors satisfy electrical distribution requirements. For information apply-

ing to your specific needs, see your Westinghouse electrical construction engineer. Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa.

J-94089-4

**YOU CAN BE SURE...IF IT'S Westinghouse**



Bridge approach to south end of Hampton Roads Tunnel. Illumination for both approaches is provided by Westinghouse OV-20 mercury vapor luminaires controlled by time switches and photoelectric relays.

**Owner:** Commonwealth of Virginia—  
Department of Highways

**Consulting Engineers:** Parsons, Brinckerhoff,  
Hall and Macdonald

**General Contractors:** Merritt-Chapman &  
Scott Corp.

(Approach bridges, portal islands,  
cut-and-cover sections, underwater tunnel)

**Tidewater Construction Corp.**  
(Portal approaches, ventilation buildings,  
mechanical and electrical work)

**Electrical Subcontractors:** E. C. Ernst, Inc.

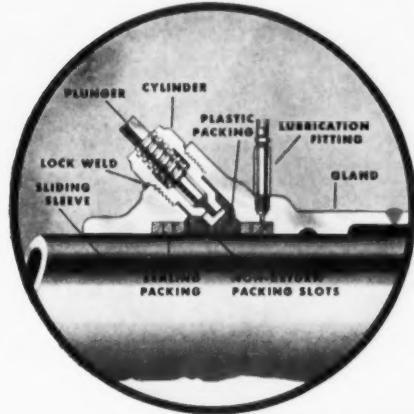
Over 250 Pages  
Westinghouse Data  
in Sweet's Construction File.



# **new savings**

## **for expansion joint users**

Cross-section of Gun-Pakt feature. To add packing, just add a plug and turn the plunger. Note non-return packing slots at bottom of cylinder.



The Yarway Type W Gun-Pakt Expansion Joint has an improved one-piece design of body and gland and improved method of packing that provide new maintenance economies and greater operating efficiency.

Bolted joint between body and gland is eliminated; the steel body includes gland and guide. Shorter face-to-face dimensions are possible. Improved angle of packing guns makes them more accessible and permits injection of the special plastic packing directly into packing space.

The famous Yarway Gun-Pakt feature permits addition of packing under full steam pressure. No need for costly shutdowns to repack.

Sizes 1½" to 30", pressures 150, 300, 400 psi. Single or double types, flanged or welding ends.

For full description, write for new Yarway Bulletin EJ-1916.



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20" Yarway Type W Gun-Pakt  
Joint with base, single type,  
welding ends, 8 guns.

**YARWAY**

**GUN-PAKT**

*...a good way to specify  
expansion joints*



## Readers' Comment

### Engineer-Manufacturer Relations

Sir:

Mr. H. A. Mayo, Jr., in his letter appearing in the December 1957 issue which commented on the October 1957 article "How to Improve Engineer-Manufacturer Relations," stated that consulting

engineers should neither engage in product design nor in the assembly of components when an already assembled item is offered on the market. Mr. Mayo also stated — "The unfortunate result is that the manufacturer is very hesitant to recommend him, and the exchange of information is then hampered."

Writing as a consulting engineer, I feel that consultants are frequently dubious about taking work where a manufacturer recommends them for this very reason, as it then appears as they are under obligation to use his product unless it is clearly understood by all concerned that the consultant will have an opportunity to evaluate fairly all products.

I also hope that Mr. Mayo does not mean that if the manufacturer does not feel that his product will be positively used, this manufacturer will be reluctant about imparting information.

Consulting engineers do not ordinarily like to design products. However, in order to render the best service to the client, the consultant should be able to design or assemble a product for the following reasons:

- † Occasionally the cost of a completely integrated product will be priced so high that the design of an alternate item will result in a more economical job.
- † The manufacturer might not be able to produce his completely integrated product in sufficient time to comply with the proposed construction schedule.
- † The manufacturer of the completely integrated product might

not be sufficiently cooperative with the consultant so that the consultant might not be able to satisfy himself that this particular product will operate satisfactorily for the requirements.

Should Mr. Mayo be interested in further elucidation of these comments I would be only too happy to cite particular cases.

J. L. Staunton  
Consulting Engineer  
New York City

### Professional Recognition

Sir:

I am returning herewith your questionnaire on "How Well are You Recognized?" This questionnaire touches a subject in which I am keenly interested; hence this explanatory letter.

The matter of public recognition and respect has been an objective of the engineering profession for quite a few years and rightly so. However, it is difficult to see how the goal can ever be reached as long as we individually and collectively continue certain policies and practices which are in quite common usage today. While I have been a member of NSPE for many years, the furtherance of the observance of "Engineer's Week" by that organization has in my opinion lessened rather than raised the position of the engineer as a professional man in the esteem of the public. On that basis, there is naturally a tendency on the part of the public to classify such an event on the same level with "National Restaurant Week," "Paint-Up and Clean-Up Week," "Be Kind to Animals Week," etc.

We will only receive the recognition and respect from the public as professional men whenever we conduct ourselves in such a manner as to warrant that respect. The public is not easily fooled. Whenever we resort to advertising (beyond the placing of a professional card) and the sending out of mailing pieces and promotional literature, then we



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These are the only enclosed conductor systems that meet all requirements of mobile safety electrification. Standard catalog parts eliminate the need for special engineering. Installation is fast, maintenance easy. Investigate today!

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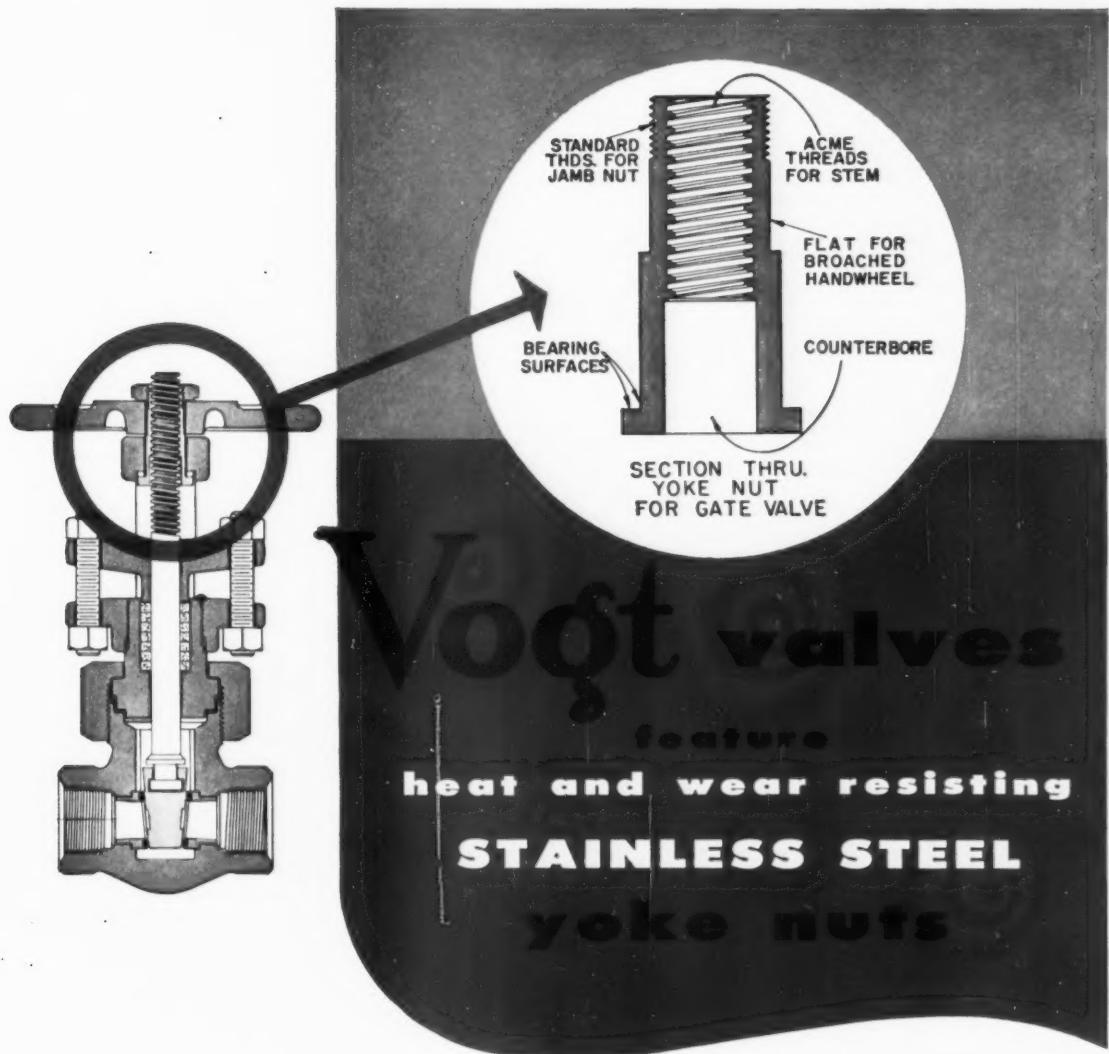
INSUL-8-CORP.  
Dept. B, 1369 Industrial Rd., San Carlos, Calif.

Rush catalog re Insul-8-Bar mobile electrification.

NAME \_\_\_\_\_

COMPANY \_\_\_\_\_

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feature  
heat and wear resisting  
**STAINLESS STEEL**  
**YOKE NUTS**

Heat and wear-resisting *stainless steel* yoke nuts in Vogt Valves give longer trouble-free service. We have proved this in our own "Torture Chamber," under constant and accelerated testing, as well as in tough service applications. They are made from a special stainless steel alloy having excellent bearing quality, matchless strength, and a melting point of approximately 2700°F.

The rotating gate valve yoke nut design, illustrated, has flats for a tight fit with the

square broached hole of the handwheel. Non-rotating yoke nuts, for globe and angle valves, are of the same superior design and quality. Vogt GP Valves are available in a complete range of sizes from  $\frac{1}{4}$ " to 2" and rated 800 pounds at 850°F. and 2000 pounds at 100°F.

*Adv. No. 6 in a series describing the features of Vogt GP Valves.*

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**VALVES**

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## in Protecting Pipe Against Corrosion

When you are faced with the problem of protecting piping underground in highly corrosive soils, a high quality coal tar coating such as called for in AWWA Specifications C-203 and C-204 is normally hot applied at a pipe coating mill. However, in many cases, the volume of pipe does not warrant this expense or the coating mill is too far away to justify the time involved.

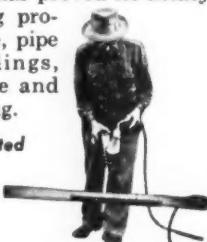
**That's WHEN Engineers  
Specify TAPECOAT**  
**... the practical alternate  
hot-applied coal tar coating  
in handy tape form**

Because TAPECOAT provides a coal tar coating equivalent in long-life protection to hot-applied coating at the mill, engineers are specifying this quality alternate material where time and cost factors preclude mill application.

This practical solution assures the protection required without the need for tar kettles, technical know-how and special crews. Field application costs are reduced because TAPECOAT is so easy to apply, using a torch to soften or bleed the pitch and then spirally wrapping it on the vulnerable surface.

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immediately create the impression in the minds of the public that we are competitive and cut-throat price-wise and are peddling a commodity or an item rather than a competent professional service. What respect can the potential client who is a layman have for our profession when he is hounded, pursued, and wined and dined as is such common practice today among the large and small who identify themselves as consulting or professional engineers. We seek to enjoy the same respect from the public as that accorded the medical profession, but would we not be astonished if our friends in that profession suddenly started pursuing us if, for instance, it became known that we were in need of surgery.

It is frequently argued by those who seek to abuse the profession that advertising and high pressure salesmanship is necessary in this day and age. Such a thesis is without foundation. Competent professional service will sell itself in any profession without the benefit of advertising and high pressure salesmanship. It is unfair and a fraud upon the public for incompetence to be maintained by such tactics.

Walter J. Parks, Jr.  
Consulting Engineer  
Jacksonville, Fla.

### Our Mistake

Sir:

I have been receiving a great deal of complimentary reaction to "Fundamentals of Nuclear Power," (Dec. 1957). However, I am suffering some embarrassment because of an error in the personal write-up you prepared. I do not teach nuclear engineering and I am not in charge of the reactor program at North Carolina State College. I do teach a course in nuclear power plants offered in the Department of Mechanical Engineering. Would it be possible to print a correction stating that it is made at my request. I am sure

you will be able to understand my predicament.

John F. Lee  
North Carolina State College  
Raleigh, N.C.

### Engineering Business

Sir:

Much has been written concerning the need to change our present laws relating to the practice of professional engineering. In particular, strong opinions have been voiced in favor of permitting corporations to practice this profession.

Regardless of the logic which may be interposed concerning the feasibility of corporate practice of engineering, the ultimate effect of such legislation would be to permit unlicensed persons to participate in soliciting engineering business, controlling engineering business, and sharing in professional fees. Thus, engineering no longer will be a profession, but a business which can be entered into by any promoter who need merely tie up with one or two professional engineers and thereby profit through their license.

This identical situation had existed in New York prior to 1935 when legislation was passed which prohibited the establishment of new corporations to practice professional engineering. This legislation was necessary because of the many abuses which had been exercised in the practice of engineering by unqualified persons who shielded themselves through a corporate veil. The 1935 law was a tough pill to swallow for these unlicensed persons, but inasmuch as no one bothered them, they ignored the law and continued to build large financial empires.

With the sudden surge of engineering, with the strengthening of the profession, with the increase in the number of licensed engineers, thus resulting in higher membership and greater influence of a united professional society, these unlicensed persons have become worried. They have

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"ROLL-CLEAN"  
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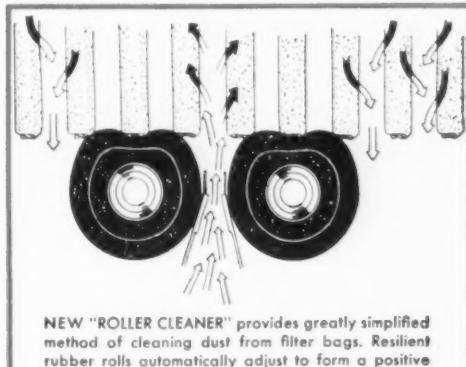
**THESE NEW FIELD-  
PROVEN FEATURES**

- Easier filter bag changing.
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- Free-rolling cleaner — no sliding.
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**PLUS THESE TIME-TESTED  
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NEW "ROLLER CLEANER" provides greatly simplified method of cleaning dust from filter bags. Resilient rubber rolls automatically adjust to form a positive dust seal as each row of bags is cleaned by atmospheric air.



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35-page Bulletin 104  
gives full details about  
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Niagara District Engineers  
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gained the support of a small group of licensed engineers, and they have undertaken an extensive and expensive campaign to convince our legislators and members of our professional society that corporate practice is good and necessary, particularly for large projects. In effect, they want to legalize their present illegal activities under the guise that it would be a good thing for engineering if corporate practice were permitted.

If the nature of an engineering project is such that it would be advantageous to operate through a corporation, this can be accomplished without changing any laws. However, the corporation could not solicit engineering work and could not invoice the client for engineering services. The corporation would be used merely for the benefit of the licensed engineer with respect to financing a project and handling many operational facets which do not conflict with the ethics of professional practice.

Even though the majority of officers and directors of an engineering corporation were professional engineers, it would be very difficult to prevent the common practice in big business of having men with the highest financial interest exercise major control. Thus, professional engineering would lose its significance as a profession and exist merely as another element of competitive enterprise.

Professional engineers must not be lulled into a belief that they will be aided by any measure which will permit unlicensed persons to participate as partners in their profession. They must form a united front to stop interlopers from attempts to tamper with their profession.

At one time, this had been the attitude of the Legislative Committee of the New York State Society of Professional Engineers. However, because of the strong pressures exerted by the Committee on Engineering Laws

which was organized by a large group of leading, influential corporations for the purpose of effectuating a law change to permit corporate practice, some members of the NYSSPE have been convinced that it may be best to compromise rather than take a beating from this multimillion dollar combine.

However, one must inquire as to how many of those persons who advocate "compromise" are in actual practice where they would feel the sting of a corporation headed by unlicensed promoters outbid an accredited partnership for a large engineering project? Such corporations might be composed of 99 percent licensed engineers, yet one promoter who never saw the inside of an engineering school could be its head and "cash-in" on lucrative engineering business.

We engineers have struggled hard for many years in order to gain recognition as a profession. Is it wise to compromise our position to a point where small consulting engineering offices would have to compete with large corporations in the selling of its services? Do we want to place engineering services in a category of just another investment business, or, as a profession consisting of trained, tested, pre-qualified, and respected individuals?

Should we really compromise? Why? If a corporation has gotten itself illegally enveloped in the engineering business and is making too much money to give it up, should we be parties to help them legalize their activities simply because they appear to be too big and too powerful for resistance by as small a group as NYSSPE.

Sure, we can help them, that is, help them set up subsidiary firms which are headed and controlled by licensed engineers. In this manner they can "eat some cake" without owning the bakery.

Raymond Mirrer, P. E.  
Counselor at Law  
New York, N. Y.

\* SEE ITEMS ON PAGES 45 & 50.

# Values You Can't Specify



You Get Them in  
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In the fabrication and erection of every high pressure and/or high temperature piping installation, there are intangibles important to the success of the job . . . things that cannot be spelled out in the specifications but are essential to getting superior piping at an economical price.

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Main steam piping at Kyger Creek Plant which has a capacity of 1,075,000 kw and is the largest power plant piping contract (combining fabrication and erection) ever performed by a single contractor.

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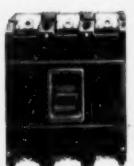
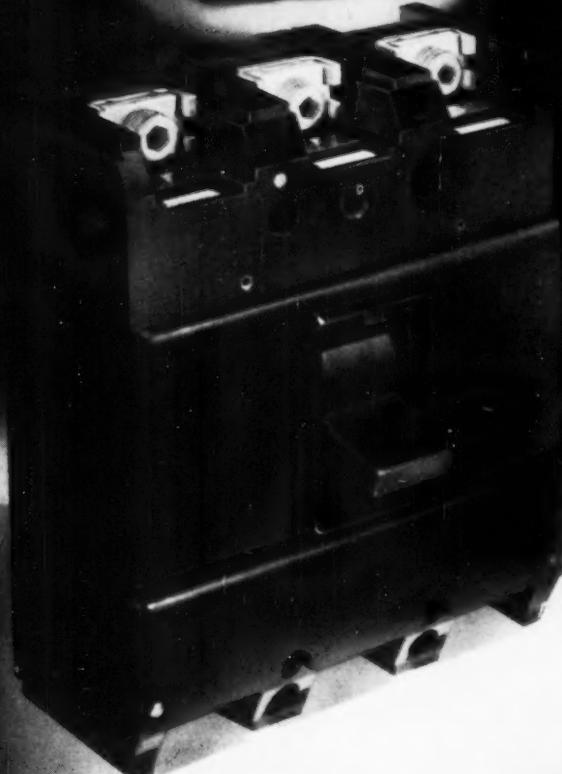
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# NOW Federal Pacific's "Giant"



1/3 Smaller Than Ordinary  
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simplifies inventory...pro-  
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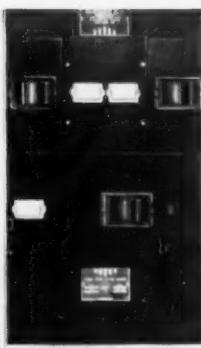
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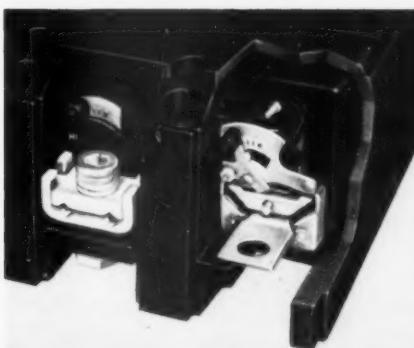
***...the most compact 400 amp. breaker  
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From the biggest AB Breaker development program in the industry—comes a steady stream of new advances. First, Federal Pacific introduced the revolutionary 11/16" wide single-pole "NE-W" breaker! Then came the convenient, cost-saving 480 v. "NE-F"! Now, Federal Pacific does it again...offers you a brand new breaker development that transcends all the others—the NJ-400!

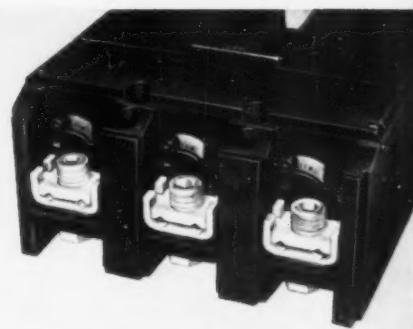
Remarkable for the compactness of its design, the new "NJ-400" permits double the number of 400 amp. circuits in a given panelboard or switchboard...allows use of smaller AB-I enclosures. Approved by Underwriters' Laboratories, the NJ-400 is the most compact, heavy-duty 400 ampere circuit breaker on the market today! Available in 2- and 3-pole current ratings of 70 through 400 amperes.



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**Remarkable Double Lug Design!** In spite of its compact size, the new NJ-400 features double lug design which permits additional conductor current carrying capacity wherever necessary.

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## Scraps & Shavings

MANY ENGINEERING ORGANIZATIONS, technical institutes, professional societies, and consulting engineer associations on every level — national, regional, state — have prepared and published minimum fee schedules for consulting engineers. These schedules are much needed, and in time it is likely that each state will have a well considered schedule generally accepted by all the established engineers. There will also be, in time, national minimum fee schedules for certain types of work (Federal highway design, for example).

Engineers generally agree on the need for accepted minimum fee schedules. But there is another side of the problem. Minimum fees for what?

Two firms of engineers may be engaged for similar projects, and both may charge the same fee based on a minimum fee schedule. One may prepare and turn over to the contractor complete, detailed drawings and specifications while the other may merely work out rough designs and loose specifications so that the contractor has to turn them over to an employee engineer to detail. The first engineer may complete his work on time, while the second may fumble around and cost his client and the contractor a lot of money.

Here are two extremely different services being offered the client, yet both are costing the same fee. It is true that we are talking about minimum fees, but minimum fees tend to become standard fees.

What we need, then, are standards. We must have minimum standards for engineering services in order to apply minimum fees. This is a complex problem, but standards of sorts can be established. (The Chicago Association of Consulting Engineers and the Missouri Association already have adopted some standards for certain types of work.)

Standards of this nature should be prepared for all types of engineering services in all parts of the country. They should be tied in with and become a part of the contract between engineer and client. They should not be expressed in generalities, but should explain clearly and exactly what should be

on engineering drawings and what should be included in specifications. As a part of the engineer-client contract, the client would not have to pay the engineer his fee unless he did supply drawings and specifications up to these standards.

In a limited way that would be a good thing. And fortunately, many consulting engineer associations and the Consulting Engineers Council understand the need for establishment of standards prior to publication of fee schedules.

But that is only a small movement in the right direction. What about the stupid engineers — the engineers who fulfill the standards to the letter but whose designs are faulty and costly?

Unfortunately, there is no practical way to make all engineers smart. But perhaps there is something that can be done to protect the client and the public from the stupid ones. First, there must be protection against the engineer who is actually dangerous. This is fairly easy. It could be handled the same way the public is protected against the bad driver. You cannot make him safe, but you can have a law requiring that he carry liability insurance — and most states do. Similarly, consulting engineers offering their services to the public could be required to have errors and omissions insurance.

This has some bad aspects, but it would really be to the great advantage of consulting engineers if every registered engineer who offered his services to the public were required by law to carry liability insurance. Not only would this protect the public, but it would separate clearly and legally the true consulting engineer making his living from fees, from the sundowner and the kitchen sink engineer. It would separate consulting engineers from registered employee engineers. It would make a clear distinction, under the law, between registered engineers who offer their services to the public and registered engineers working as employees.

Mandatory liability insurance for engineers offering their services to the public would go a long way toward protecting the client — and the public — against the dangerously stupid engineer.

It would do nothing, however, for the client whose engineer is safe enough but costly stupid — the engineer who makes the column not only large enough but five times large enough; the engineer who solves every difficult design problem by applying a factor of safety to his factor of safety.

That, too, has a solution . . . but that is the subject for next month's column. □

# MECHANICALLY OPERATED POPPET TYPE VALVE

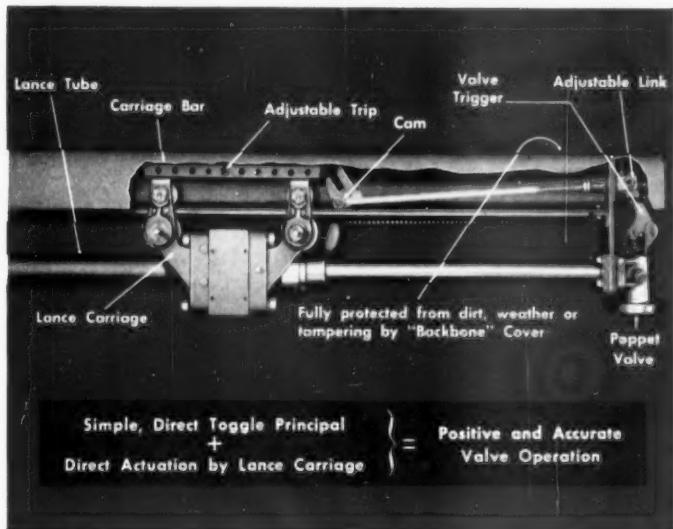
(WITH ADJUSTABLE PRESSURE CONTROL)

additional important features of the

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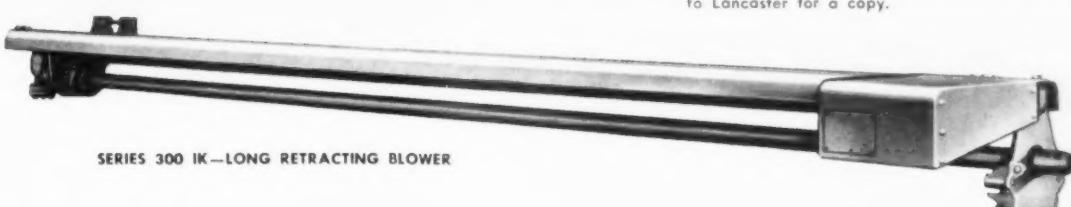
## Series 300 IK LONG RETRACTING BLOWER



This valve was adopted for the new Series 300 IK because long experience has proved it the most satisfactory of all designs for severe blower service. More than 300,000 of this basic design are in use on various Diamond Blowers and have established notable service records. A recent improvement is more streamlined flow contours that permit higher flow rates with less pressure drop.

The direct mechanical linkage for actuating the valve offers the advantages of greater reliability and safety . . . in addition to more accurate control. Numerous other important features of the Series 300 IK are listed at the bottom of page. These are the reasons why this blower is establishing a new standard of efficiency, economy and dependability in cleaning heating surfaces that require a long retracting blower.

Bulletin 2111CE tells much more about the Series 300 IK; ask your local Diamond office or write directly to Lancaster for a copy.

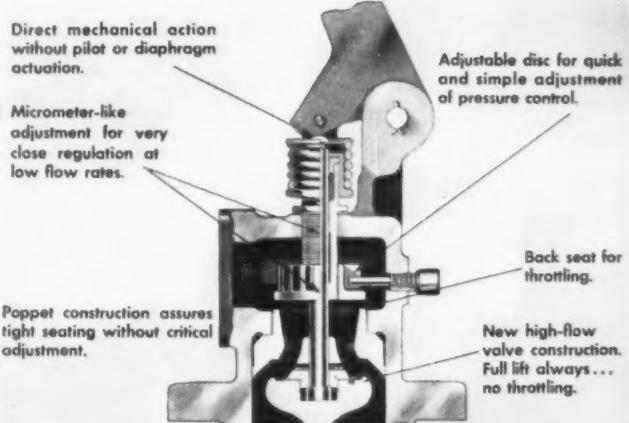


SERIES 300 IK—LONG RETRACTING BLOWER

### OTHER ADVANTAGES OF SERIES 300 IK BLOWERS

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- Compact, Accessible Electric Power and Control Terminal Facilities
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- Improved "Type A" Nozzle
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- Oversize Lance (Step-Tapered for Extra Long Travel)
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# Flynn aluminum bridge railing



City of Chicago Calumet Skyway Toll Bridge, built by Dept. of Public Works. Consulting Engineers, De Leuw, Cather & Co., Chicago. Photograph by Hedrich Blessing.

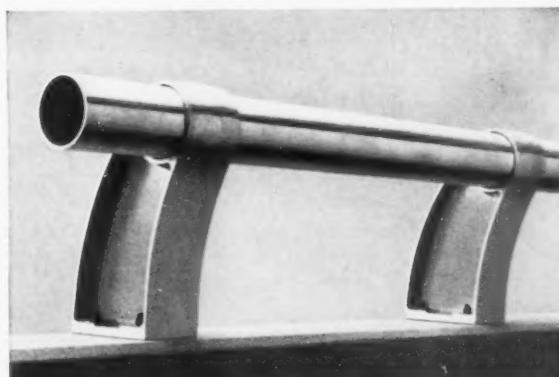
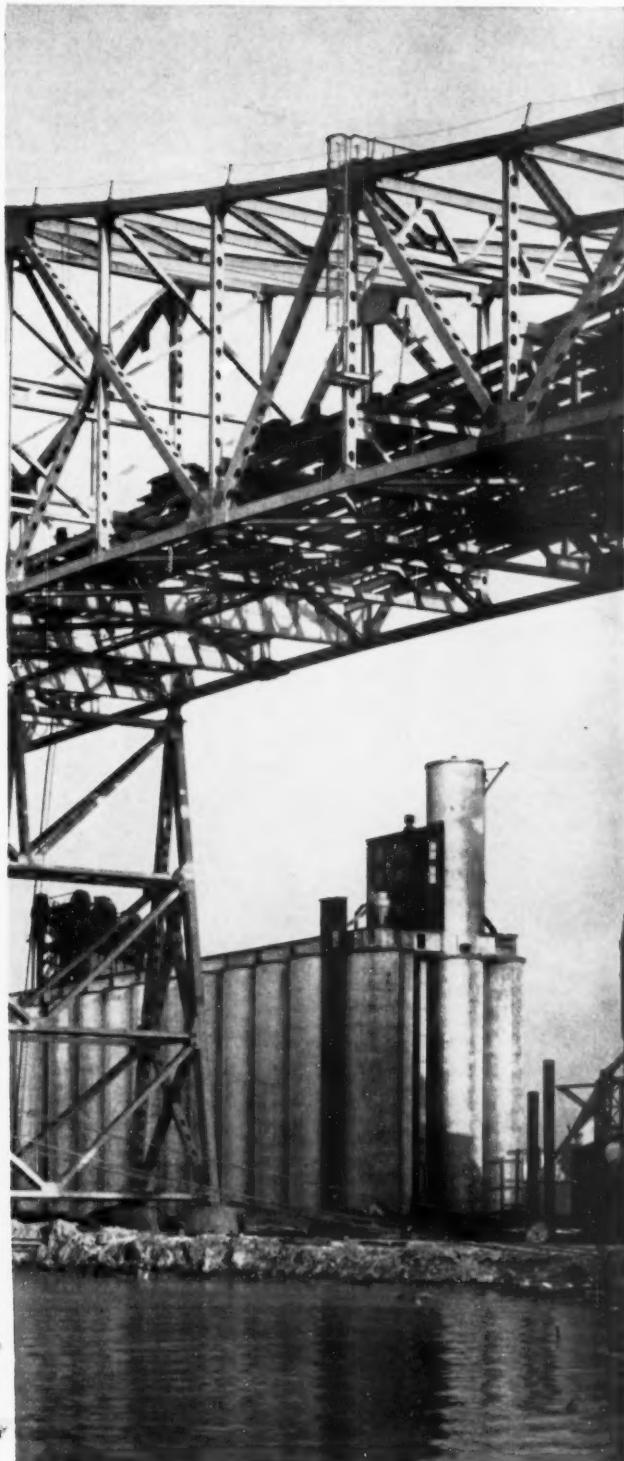
# chosen for Chicago Calumet Skyway

## New shape of things to come!

This is a section of Chicago's Calumet Skyway Toll Bridge project, soaring out of the Southeast and spanning some seven and a half miles between the Indiana East-West Toll Road and the Chicago South Side. Michael Flynn is supplying extruded bridge and highway railing for this vast project—more than 56,000 feet of lightweight, low-cost aluminum rail.

This \$101 million Skyway must serve the growing needs of Chicago for many years to come—one reason why *lasting aluminum railing* was specified. Flynn rails and posts never need painting, never require replacement or costly maintenance. Installation is handled by a *two-man team*, without the use of cranes or lift-trucks. It's fast, clean, easy work. And when construction schedules are tight, as they are on Chicago's Skyway, you can depend on Flynn for fast, prompt delivery.

Perhaps you're planning a project right now, a project in which Flynn bridge and highway railing could save you money and time—and trouble, later on. Flynn's system of *standard designs* makes possible many distinctive post-and-rail combinations, limited only by your imagination and the problem at hand. The man from Flynn would like to talk to you about it. Call or write him, soon.



More than 56,000 feet of railing and 6,474 Flynn post castings will be used on Chicago's Calumet Skyway. This post is one of many Flynn standard designs, available to you for distinctive, low-cost bridge and highway construction.

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EXTRUSIONS



### Engineers Return

Even the casual reader will note the new appearance of our cover. He will see that the reporter who occupied the dominant position on the cover last month has been relegated to respectable but less prominent position up in the corner. Once again the central figure is a distinguished consulting engineer. We rather like this new arrangement, designed by Art Director, Philip Reed. (Reed also is the artist who does all the little woodcuts scattered through the book as department heads.) The portrait this month is of Milo Ketchum, principal partner in the structural engineering firm of Ketchum & Konkel, of Denver, Colorado. Milo Ketchum is a quiet and scholarly individual. While he is acknowledged to be one of the most technically astute engineers in private practice, he is more than that. He is what more engineers should be—an erudite gentleman, as knowing in history and literature as in the sciences.

Last month we published an article called "How Well Are You Recognized." It was a report based on a Survey of the Profession, and it told how consulting engineers felt about how well the public and certain client groups understand their function. (They thought they were not understood very well.) Now, this month there is a follow-up article, "Plans and Projects to Promote the Profession." It tells what individual firms and the several engineering associations are doing to promote an understanding of consulting engineers. The need for an educational program is enormous. As just one example, a long news story just appeared in the January 12, *Richmond (Virginia) Times Dispatch*. The head is "Consulting Engineers' Cost Said 5½ Millions." This story, by-lined by Allan Jones, tells what Virginia Highway Department officials have to say about the cost of using consulting engineers for highway design work. To quote, "Department officials said the agency's own engineers—if they had been available—could have done the work for about one-third of this amount." The story goes on to explain how the state plans to hire 50 engineers and 200 technicians (an increase of 18.2 percent) in 1958, and build a new building to house them (\$2½ to \$3½ million), thus eliminating the need for the services of consulting engineers. The public read this story. They have not read any answer to it. They have not had it explained to them that this is just another magnificent attempt by bureaucrats to increase their power and position by enlarging the number of government employees under their direction. The state officials know well that no group of state employee engineers can do highway design for one-third the cost of consulting engineers. Wherever studies have been made, it has been clearly proven that consulting engineers can do the job at less cost than highway department engineers. But who is going to tell the facts to the voting public? There is no consulting engineers association in Virginia, and there are more state employee engineers than independent consultants in the Virginia Society of Professional Engineers. Who is going to speak for the engineer in private practice?

### Promotion of the Profession

### Feed Pump Suction Systems

It is obvious the CONSULTING ENGINEER is not, by strict interpretation, a technical magazine. We deal more extensively with professional and business problems than with technical solutions. But occasionally we come upon an article that deals with the technical aspects of design in a way that deserves to be put before our readers. Such an article is "Ideas for Feed Pump Suction Design," by A. E. Kittredge, who is not a consulting engineer but the president of the American Water Softener Co. He has prepared a careful and unprejudiced paper on some important improvements that can be made in the design of feed pump suction systems. It will be worth your while to study his ideas if you design or are associated with the design of steam plants.

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### Cathodic Protection

It was fifteen or twenty years ago that the technical magazines started publishing articles on the protection of buried metallic structures with small amounts of direct current. Here and there someone would apply cathodic protection to an underground tank or some other large piece, but it was always felt to be some sort of trick. Then, after the War, when cross-country pipelines were put in place, cathodic protection gained a bit of respectability as a result of its application on these great projects. But as W. P. Monroe of Sargent & Lundy, Chicago, the author of the article, "Cathodes Can Protect Your Projects," page 80, points out, most buried structures around an industrial plant or even a utility are under the care of mechanical engineers, and they do not believe in electricity unless it is moving a motor or lighting a light. After all these years, though, it is time mechanical engineers understood that cathodic protection is real. It works. It saves your client money.

One of the reasons it is so hard to get a clear definition of a consulting engineer is that consulting engineers will do almost anything for a fee. (We mean this in only the kindest way.) A consulting engineer will select a plant site, advise on air pollution, make stream flow measurements in Costa Rica, survey Manhattan or Montenegro, design a heating system for a skyscraper, or build a bridge. The trend is toward even broader activity. But there are still some specialists. One of them is John Harju, of Detroit. He concentrates on industrial plant layout and manufacturing methods. He feels that the plant structure should be adapted to the process, not the other way around. He takes it upon himself to study the client's process, simplify it so far as he can, and then lay out the production machinery and the materials handling systems. Once this is done, he works with the architect, and other consulting engineers to develop the best structure to house the process. This is an engineering service often neglected by other consulting engineers. To see how Harju goes about his consulting work, read "Industrial Production Planning," on page 84.

### Plant Layout

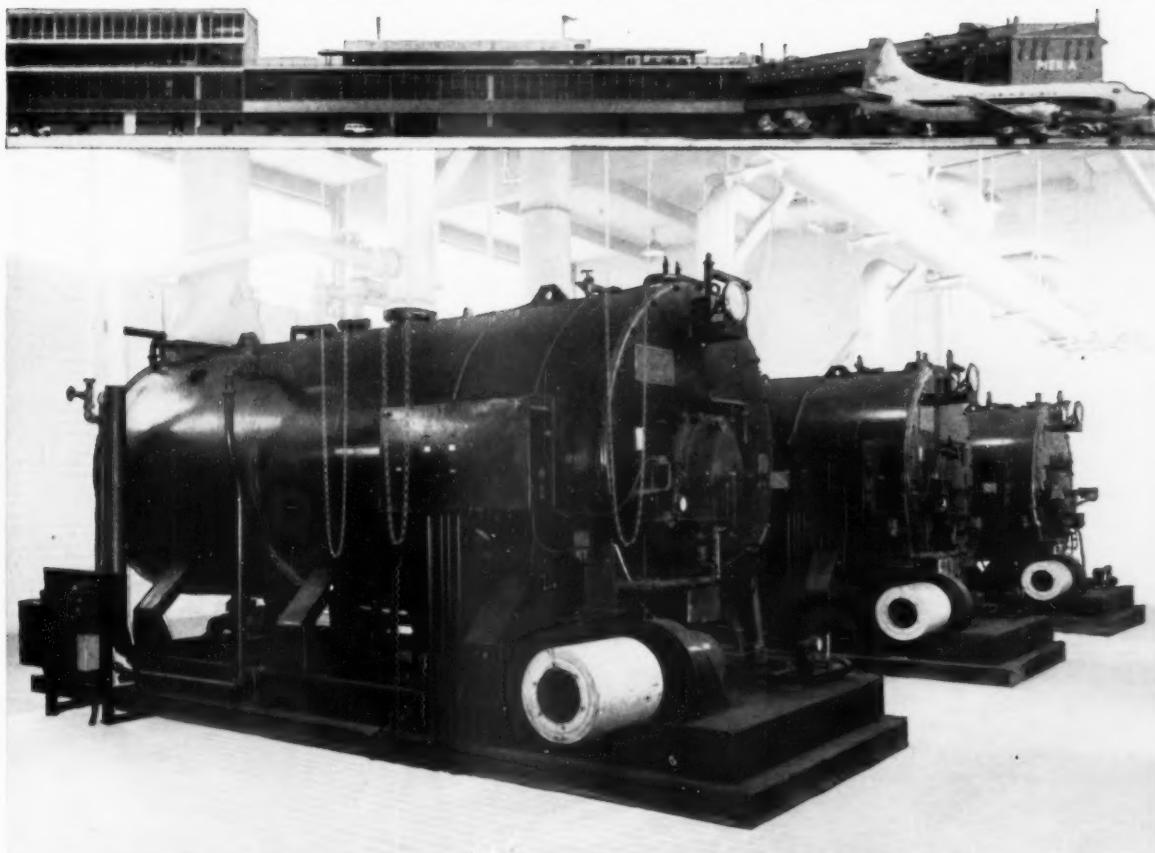
### Fresh Water From the Sea

Those lines from the Ancient Mariner, "Water, water everywhere, nor any drop to drink," are becoming less and less descriptive of the waters of the oceans. It is no longer a question of whether salt water can be changed to fresh, but of how much it costs. We know how to take salt out of water as a large scale operation, and we now have only to continue to reduce the costs. G. E. Sonderman, of Singmaster & Breyer, consulting engineers, has written an article, "Today's Price for Fresh Water from the Sea," published on page 95, that goes into the economics of this matter rather thoroughly. Already the conversion of salt water to fresh is less expensive in many parts of the world than shipping water in by tanker. In fact, the cost of conversion has come down so rapidly that distillation is competing with long pipelines and aqueducts. A few years may see some sea coast cities in this country getting their water from the ocean rather than from distant sources of fresh water.

Perhaps the most important difference between the scientist and the engineer is the engineer's close association with economics. The scientist, in his investigations, is primarily interested in "Can it be done?" The engineer is interested in "Can it be done at the right price?" Because of this, the engineer, particularly the consulting engineer, must always have in mind his client's money. Usually the consultant sees this as a need to save in every way he can in developing his design and preparing his specifications. But remember, the client's tax position can cost him money with one hand while saving him money with the other. For example, if his client has had a good financial year and is paying 52 percent income taxes to the Federal government, he will be interested in having as much as possible of a project's construction costs charged to "expense" rather than to his capital account. The engineer can help if he is informed on tax law. He can work with the client's attorney or accountant and save magnificent sums legally. It is really simple. Look at Arthur E. Rowe's article, "Financial Planning for Your Clients' Industrial Construction."

### Financial Planning

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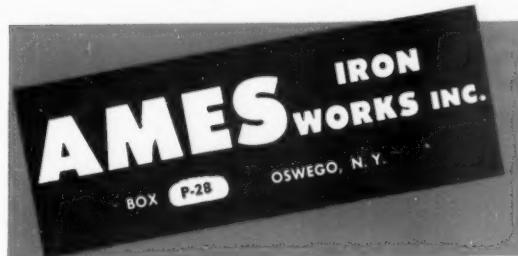
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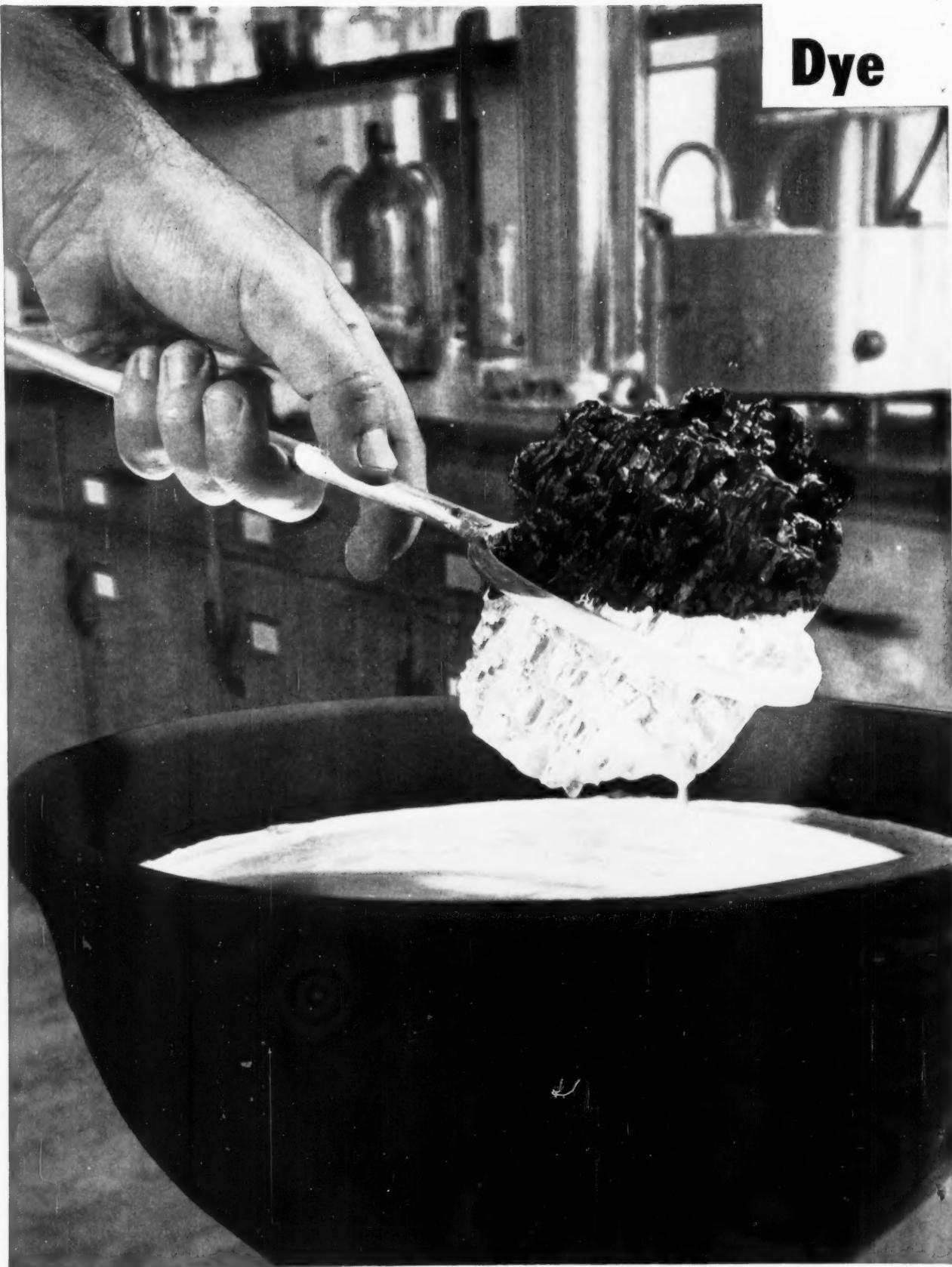
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# maker brightens fuel cost picture

**Burning coal at Toms River-Cincinnati saves 20% on fuel costs, permits clean steam generation**

The Toms River-Cincinnati Chemical Corp. plant in Toms River, N.J. is the most modern plant of its kind in the world. Producing vat dyestuffs requires a large dependable steam supply for chemical processes and heating purposes. To fill these requirements, the power plant at Toms River-Cincinnati is as up-to-date and efficient as the general plant itself. The fuel used for steam generation is *coal* because, on the basis of cost per thousand pounds of steam, the nearest competitive fuel costs 20% more than coal. In addition, thanks to automatic operation and modern equipment, the power plant meets the rigid standards of cleanliness required in such manufacturing operations.

#### Facts you should know about coal

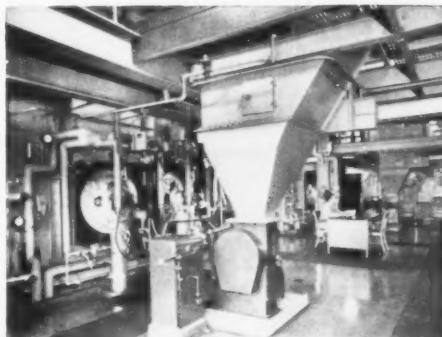
Not only is bituminous coal the lowest-cost fuel in most industrial areas, as in the case of Toms River-Cincinnati, but up-to-date coal burning equipment can give you 15% to 50% more steam per dollar. Today's automatic equipment pares labor costs and eliminates smoke problems. And vast coal reserves plus mechanized production methods mean a constantly plentiful supply of coal at stable prices.

#### Technical advisory service

All companies planning a new power plant, or the remodeling of a present one, should consult an engineering firm on its design and construction. As a matter of fact, every Bituminous Coal Institute advertisement advises its readers to take this step. When you have such a project, our Engineering Staff will be glad to assist you in your fuel cost survey with any coal information you may require.

Meanwhile, we believe you will be interested in our informative case history booklet, complete with data sheets. Write to the address below for your copy.

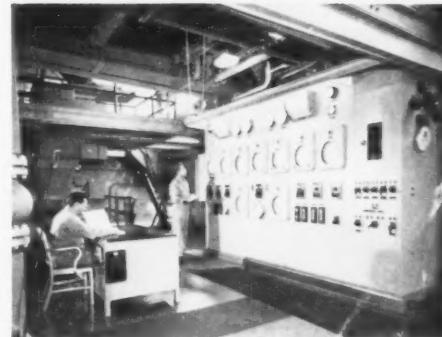
View of boiler room showing both 50,000 lbs. hr. boilers, by Riley Stoker Corp. Each has two burners. Center foreground is automatic weigh scale, by Richardson Scale Co., which receives coal through hopper from live storage bin and passes it to coal feeder. Coal is fed to Riley Pulverizer in basement, then blown back up to burners.



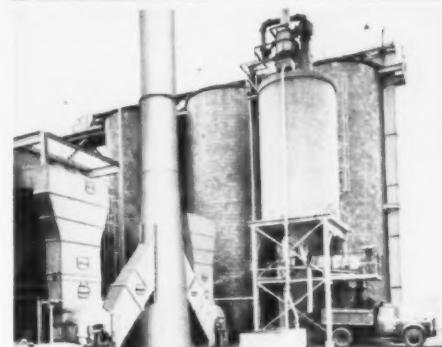
Close-up of Gifford-Wood Roundabout Bucket Conveyor beneath coal storage silos. Transversing feeder-car is used when coal is emptied from silo and conveyed to live storage bin.



Automatic combustion control and instrument panel by Bailey Meter Co.



Fly ash being loaded on truck through a dustless rotary unloader. Fly ash is collected by Prat-Daniel Mechanical Precipitators. A pneumatic ash collecting system by United Conveyor (with tie-ins under air heater and at base of stack) removes it to this 20-ton ash silo. In the rear are three 330-ton coal silos.



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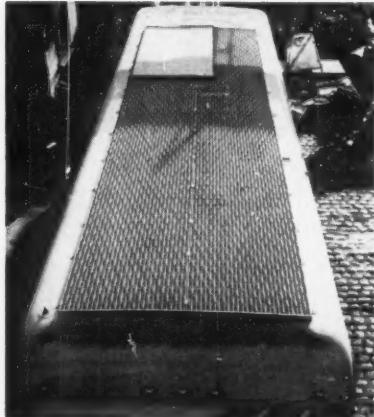
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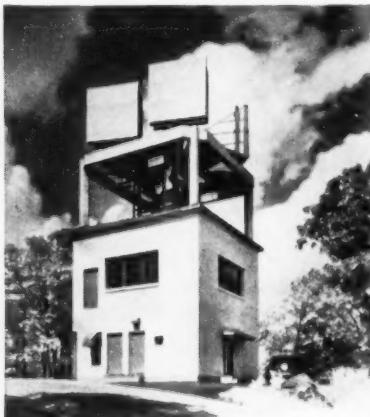
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# The Word from Washington

EDGAR A. POE  
Consulting Engineer Correspondent



MORE consulting engineers appear likely to be summoned to Pentagon huddles this year in behalf of their civilian clients. Congress is demanding that the Pentagon, the world's largest spending agency, stop doing so much of its business with large firms through negotiations behind closed doors.

Congress is calling on Military Procurement Officials for competitive bidding in connection with certain phases of the colossal spending through the Pentagon for materials, equipment, and construction. Because there is going to be more open bidding, competition is expected to be keener because more bidders will participate. Under the past system, many small firms never heard of the business opportunities. Only the large firms that could afford to keep representatives in Washington were fully apprised of the wants of the military. Independent consultants may be able to help these smaller firms in their dealings with the military. Consulting engineers, however, must be watchful to see that the demands of Congress for competitive bidding are not interpreted as a requirement for competitive price bidding for professional services. Many government procurement offices are just beginning to understand proper negotiation procedures for consulting engineers' services, so they should not be permitted to slip back into old, unprofessional procurement practices.

FOR the 12th consecutive year construction activity broke dollar volume records in 1957, and 1958 is likely to smash the previous year's records by \$2 billion or more, according to the Associated General Contractors, Inc. That trade organization, after a nationwide survey, said the 1957 total of about 65.2 billion in the continental United States consisted of \$47.2 billion in new construction, and \$18 billion in maintenance and repairs.

Some economists in Washington, both in and out of the Government, are concurring that the gradual rise in home building that began last autumn will continue in the first half of 1958, with an even stronger last half. The prediction is that more than 1-million new housing units will be constructed because of easier mortgage credit and long spiraling costs apparently checked for the present.

**I**N the face of rising unemployment in some sections of the country, labor unions are preparing to conduct hard-hitting campaigns in 1958 for wage increases. Labor union chieftains acknowledge, however, that the layoffs and unemployment have hurt their scheduled demands for higher pay and shorter hours.

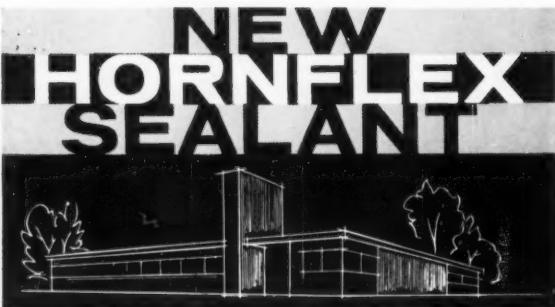
**A**SPECTACULAR military reactor program is under way in this country. Five reactors currently are operating for the military, 20 are being built, and engineers are designing an additional 14. The first prototype reactor has been in operation about five years and the first nuclear-powered submarine little more than two years. Work has begun on the Navy's first nuclear-powered surface ship.

Plans are well under way to convert the Navy to nuclear-powered operations. The Army is keenly interested in developing small mobile atomic power plants for remote regions. It has engineers developing the mobile program. The type of plant will be one of a family of small plants which can provide heat and electricity for military installations where the supplying of conventional fuels poses a logistical problem.

Dr. Charles G. Manly, chief of the Atomic Energy Commission's commercial development branch, says the purely civilian nuclear power program is making progress despite the higher than estimated costs. The AEC has a program under way for building small experimental reactors to permit study of new concepts of nuclear power. Dr. Manly said that nuclear power costs may decrease rapidly as experience is gained.

Government and industry atomic expenditures are rising steadily. The current backlog is estimated at more than \$225 million. As 1957 ended there were 42 research and test reactors operating in this country with 19 being built and 15 more under contract.

Meanwhile a forecast conducted under auspices of the Atomic Industrial Forum estimates that there will be no significant increase in the rate of power reactor construction in the United States until the middle of the 1960's. Dr. Manly probably summed up the opinion of most nuclear power authorities in this country with this observation: "Nuclear power



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reactors will be built in this country on a large scale only after the cost actually or prospectively is economically competitive over the life of the plant. When this will happen still is shrouded in imponderables. Part of the answer depends on how much effort is devoted to research, development, and engineering. While the future looks potentially very bright for the industry, there is a factor that one should bear in mind. Contrary to some popular notions, the cost of uranium in terms of energy is not necessarily lower than that of coal or oil . . ."

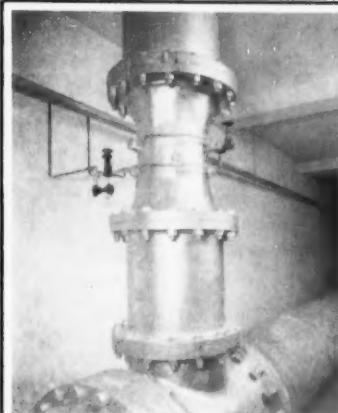
THE Administration will not recommend any new public works project this year because much of the legislative program will be directed to meet the Soviet satellite challenge. The Water Pollution Act, which authorizes the Federal Government to spend up to \$50 million a year on municipal sewage projects, might be repealed.

THE law-makers seem likely to follow the recommendations of President Eisenhower to extend for another year excise and corporate taxes. There is also likelihood that Congress will pass legislation increasing postal rates. President Eisenhower and his Administration are discouraging any pay increases for postal or other Federal workers unless Congress first approves postal rate increases.

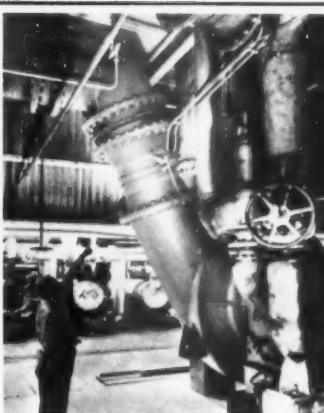
BOTH Democratic and Republican leaders in Congress feel that measures will be passed to curb labor union powers without depriving the unions of their bargaining rights. Measures to tighten provisions governing the hundreds of millions of dollars in pension and welfare funds seem certain to pass. Still another proposal likely to become law is one to require unions to disclose publicly their financial reports which they now file with the Labor Department. On the other hand, a Federal right-to-work law will not make any headway at this session, even though 18 states, most of them in the South, have right-to-work laws.

A MEASURE that would authorize \$766 million for Federal buildings, which Congress has approved, is pending before the House Public Works Committee. As originally approved by Congress the 98 buildings were scheduled to have been built under the Lease-Purchasing Act which floundered for two years. Whether or not the lifting of the 4-percent interest rate to attract private capital will make it a successful law remains to be determined. Under the Lease-Purchase program the Government would pay for the buildings as though it were paying rent.

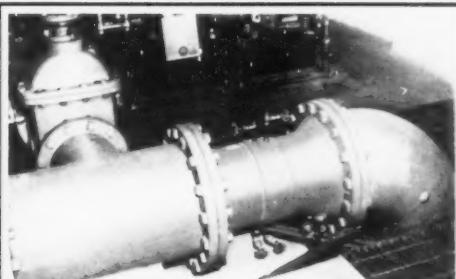
Congress, just as it has each year since World War II, appears reasonably certain to pass housing legislation. It seems to have set an annual pattern by yearly passage of a housing law. Since



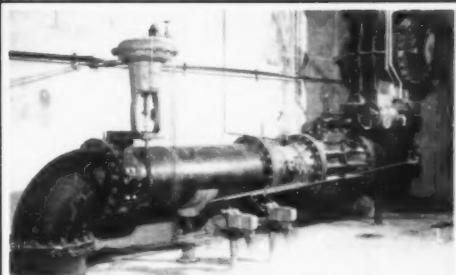
16" Gentile Flow Tube in  
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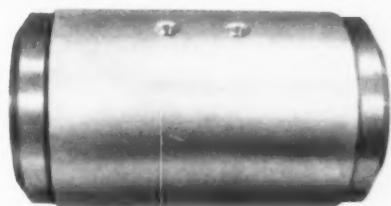
24" Gentile Flow Tube  
metering air in Oil Refinery.



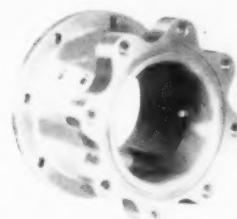
12" Gentile Flow Tube in a Long Island Waterworks  
Pumping Station, connected directly to 90° El.



One of twelve 20" Gentile Flow Tubes  
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8" Gentile Flow Tube with Welding Ends.



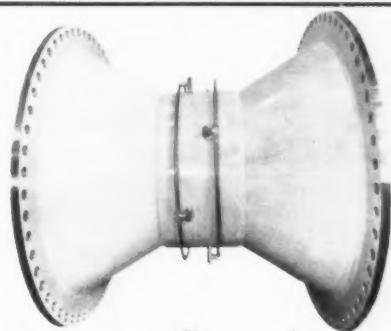
Lightweight Flow Tube for Tanker (refueling) Plane.



Gentile Flow Tube for 2500 PSI.



Axial view of 8" Flow Tube  
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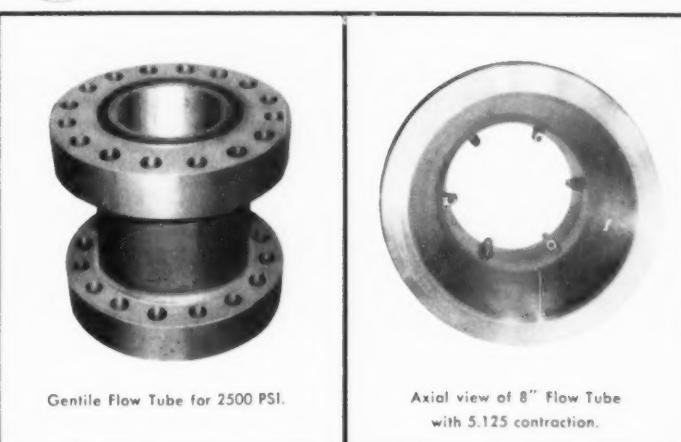
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1945 some 5,000,000 veterans have built homes under the GI laws, but because Congress refused to lift the 4½-percent ceiling on GI loans, the 1957 program lagged somewhat because of the tight money situation.

**F**EDERAL Housing Administrator Albert M. Cole reports that more and more cities are launching workable housing programs. He said the vast upsurge in community strength is unprecedented. "Make no mistake about it, never in the life of man have there been so many changes in the offing or so many portents in the air."

**A** CONTROVERSIAL proposal to provide Federal aid for public school construction may be called up again, but odds are still against its passage in 1958. If anything the proposal seemingly has lost ground since the House killed it in the first session of the 85th Congress.

**A** NUMBER of bills affecting the accelerated highway construction program will be considered during the 1958 session of Congress. The Legislators will study extension of the 13-year Federal authorizations of \$25 billions under the present law to 16 years. Sufficient funds to build the 1956 authorized 41,000 miles of Interstate Highways may require longer than 13 years because of the substantial increase in construction costs.

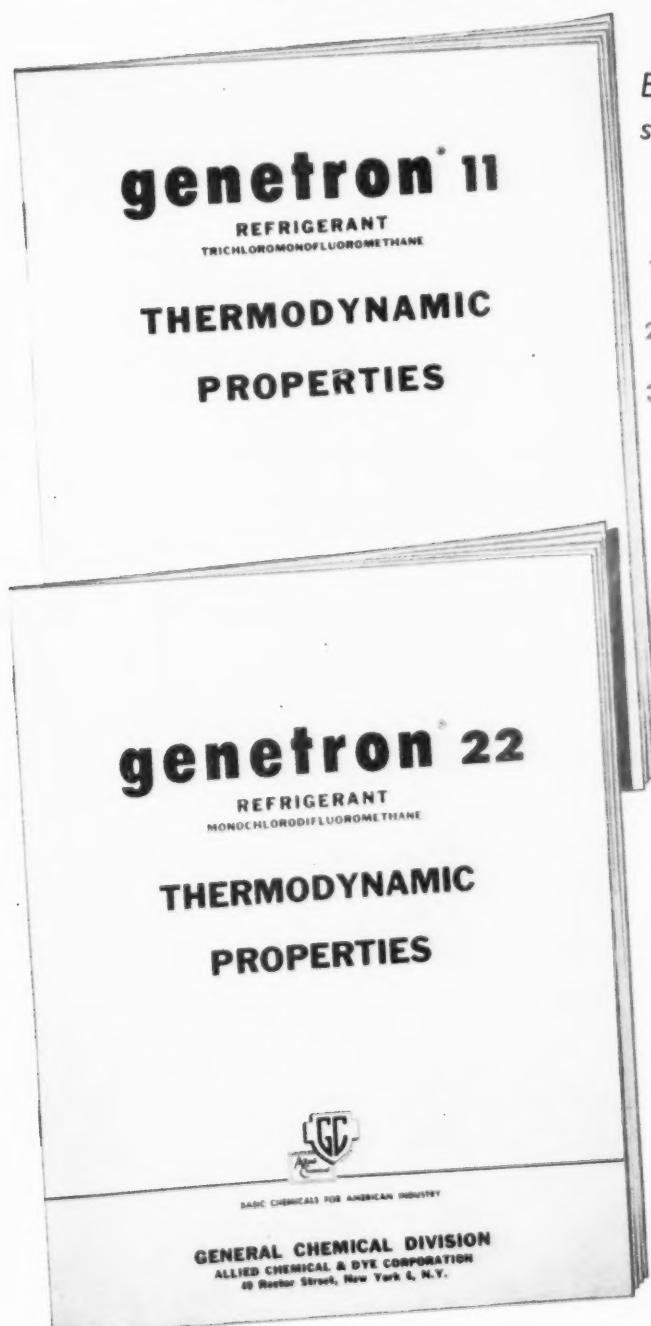
Virginia Senator Harry Flood Byrd, the "watch dog" of Federal spending, already has made it clear that he will oppose any highway legislation that goes beyond a pay-as-you go basis. The Eisenhower Administration will make no recommendation for additional interstate mileage this year. Therefore, it appears fairly certain that the presently authorized mileage will remain the same.

**I**N an all-out effort to catch up or surpass Russia in the missile-satellite field, Congress is likely to give the Defense Department an additional \$1 billion or more for the 1959 fiscal budget. However, some members of both major political parties feel that the Defense Department should do some belt tightening and close down some of its army camps, air bases, and Navy installations in order that more funds can be provided for the space conquest race with Red Russia.

**P**ROPOSALS that are also in the doubtful category include the Alaska and Hawaii statehood bills; raising the interest rate charged by Rural Electrification Administration to power and telephone companies from 2 percent to 4 percent; giving the Tennessee Valley Authority (TVA) authority to expand its public power program through a huge bond issue; and further liberalization of the social security program.

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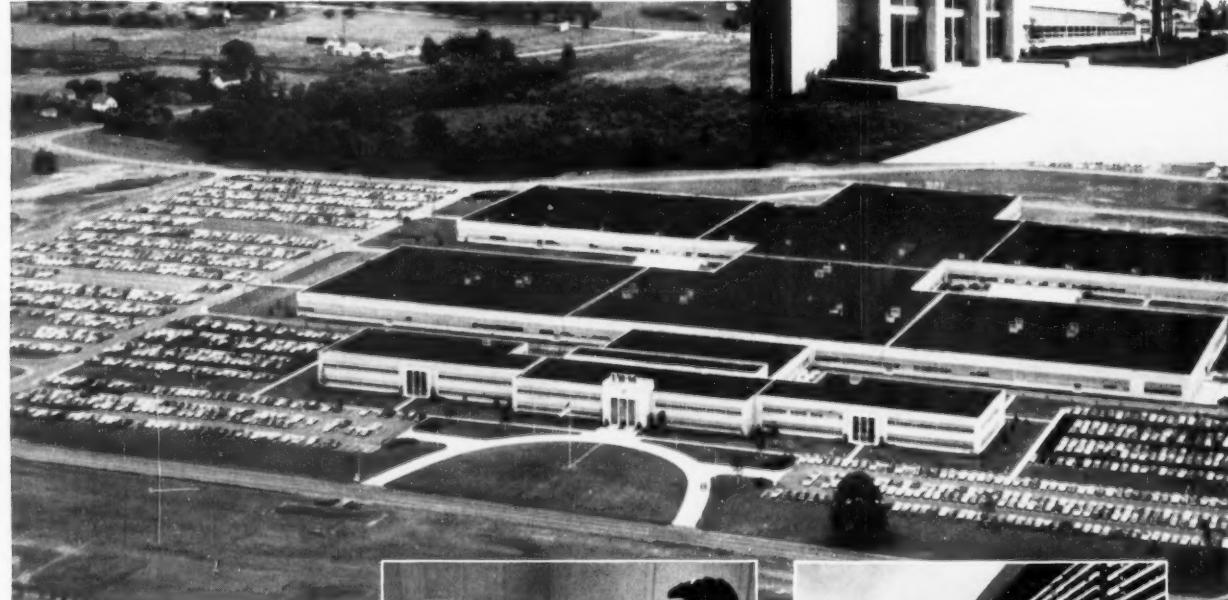
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Focal point of the SAGE Air Defense System is the round scope portion of Display Console shown in photo at right. It can depict the over-all battle or focus on part of it.

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One of the SAGE Air Defense System Display Consoles.



Input frames (front view) thru which all radar information is processed.

View of Pluggable Unit Assembly department.



One of many Quality Control areas.



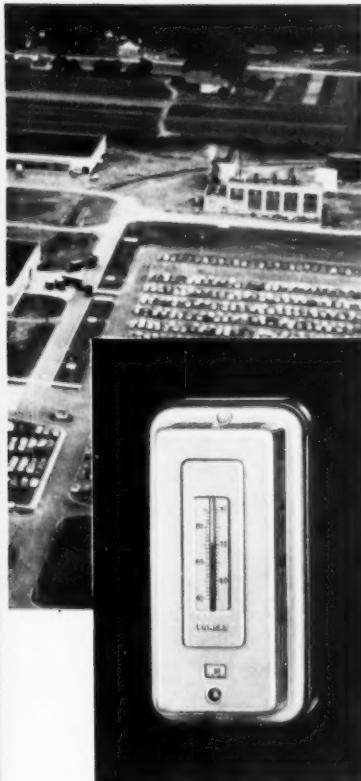
View of Manufacturing-Engineering department.



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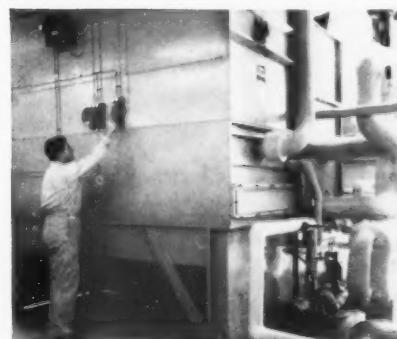
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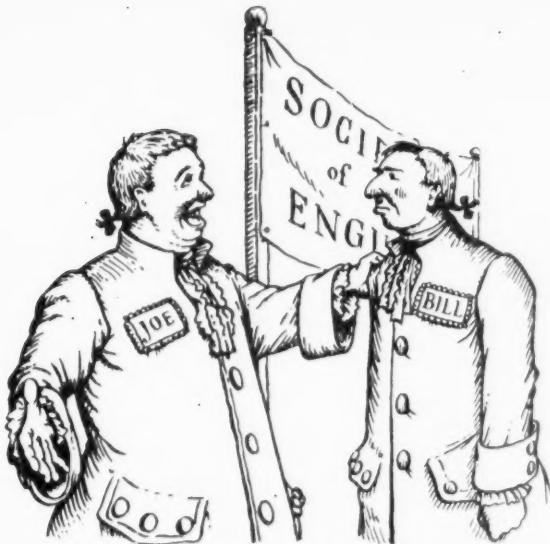


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#### The largest number of New York State Society of Professional Engineers members ever to participate in a mail balloting recently voted, by more than two to one, in favor of leaving the New York State education law as it is—setting that group against the corporate practice of engineering.

The vote was 1247 against allowing corporate practice, to 606 in favor of corporate engineering. Of the society's 5500 members, 1853 voted.

However, not too many people are under the impression that this ballot of the NYSSPE will accomplish much. The Committee on Engineering Laws, a group backing corporate practice, is expected to continue business as usual, requesting again this year that the New York laws be changed.

At the last meeting of the Consulting Engineers Council, in Springfield, Ill., the attending Southern delegates complained loudly about being forced to stay in the Abraham Lincoln Hotel. Now, they are getting their revenge. The next meeting of the Board of Directors of the Council (Feb. 6) will see several conservative Yankee Republicans lodged at the Roosevelt Hotel, in New Orleans.

Last month, the Civil Service Commission began a program of introspection to see how a new program of separating the engineers from the technicians is working. Aim of the program, initiated in 1957, is to get better use of both engineers and technicians—as well as raising the general level of government engineers.

Fitting the job to the professional abilities of the personnel was a drawn out and, at some points, rather touchy question. Some graduate engineers, lacking incentive, had become firmly established in technician-level positions which required them to do nothing more than live long enough to collect a pension. These men, under the new program, will

## Heard Around Headquarters

### STAFF

have to perform jobs suiting their engineering educations or to accept the technician-level pay for their technician-level job.

The technicians also are getting an added advantage under the new program. Some of these men, with years of experience, can handle more advanced work than they have been given in the past, thus freeing engineers for professional duties.

The new program also offers technicians a chance to become engineers by passing a special examination. However, Civil Service officials explained that the examination is so difficult that only about 10 percent of the technicians can pass it, and engineers have been known to fail the test.

The new program, the Commission hopes, will encourage more engineers and technicians to make government work a career.

Peter J. Reidy, of Purdy & Henderson Associates, has been re-elected president of the New York Association of Consulting Engineers.

Other officers are John F. Hennessy Jr., of Syska & Hennessy, mechanical vice president; Matthew Hiller, of Matthew Hiller, Consulting Engineer, structural vice president; Richard T. Baum, of Jaros, Baum & Bolles, treasurer; and Samuel A. Bogen, of Bogen & Alston, secretary.

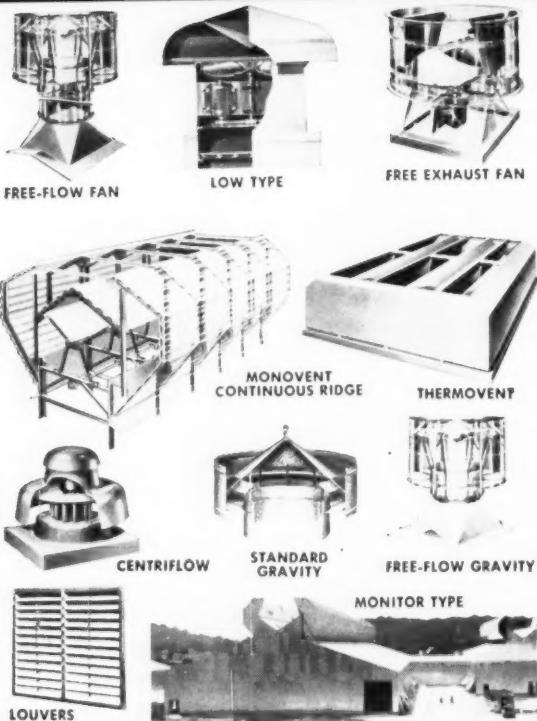
John O'Keefe, of Levy & O'Keefe, declined an invitation to serve another term as vice president.

The Association also voted to raise initiation fees from \$25 to an amount equal to 50 percent of the member's annual dues. Dues are calculated on a sliding scale.

The Buffalo decision, in which the National Labor Relations Board ordered professional engineers to include nonprofessionals in their union, has been appealed to the Supreme Court. This case, in which EJC and the NSPE acted as friends

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of the court, could cause complications for the new Engineers and Scientists Guild.

Rulings, up to this point, have been that engineers are entitled to a union consisting of only professional engineers.

The ESG is formed on the theory that engineers and technicians should stick together. Charles Hall, chairman of the ESG steering committee, said that if prior rulings are upheld by the Supreme Court, it will not affect groups now in ESG, "but it could be a complicating factor in our future organizing."

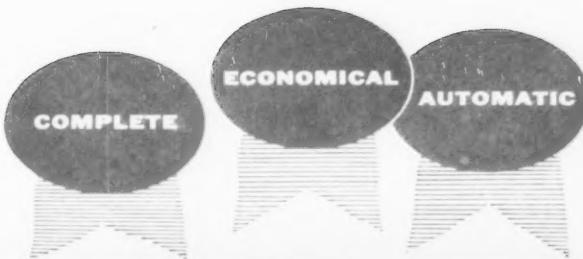
Just a few weeks ago the City of Peoria, Ill., sent out a request for bids for an engineering parking survey, complete with a proposal guarantee requirement of a certified check for \$500. A member of the Illinois Association of Consulting Engineers, who received one of these requests for bids from the City, passed it along to Clifford Abraham, Chairman of the IACE Ethics and Grievance Committee.

Abraham took immediate action by writing to Peter Bardezbanian, of the Division of Purchases in Peoria, explaining that consulting engineers did not bid on a price basis and going on to tell just how a city should select an engineer.

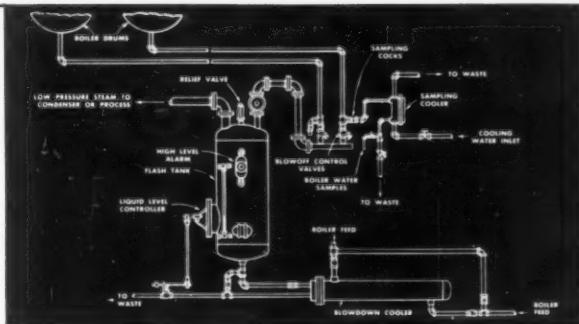
It worked. The request for bids was withdrawn immediately, and now Peoria is among the growing group of cities that understand how they should negotiate for professional services. Peoria officials simply did not know that bidding on a price basis was unethical. This is another example of the need for better understanding of the consulting engineer.

New York City, which has been plagued in recent months by charges of graft in the Buildings Department, has taken action. A committee, appointed last summer to study the buildings department inspection system, includes two prominent consulting

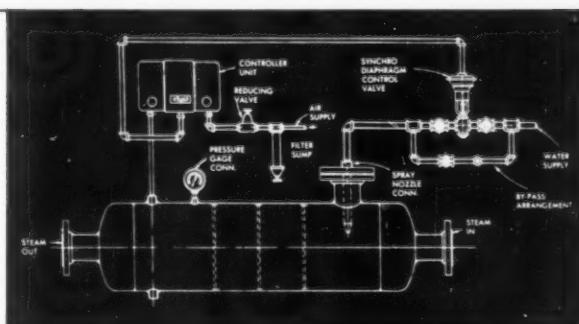
# Standard WHITLOCK Systems Save Money in the Boiler Room



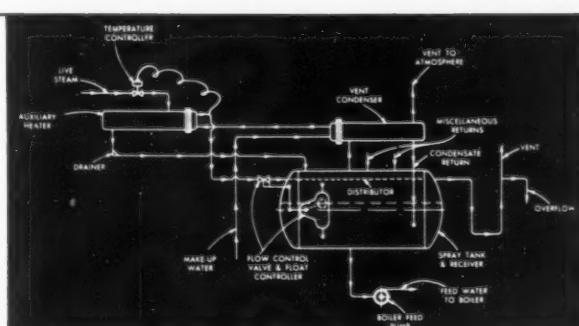
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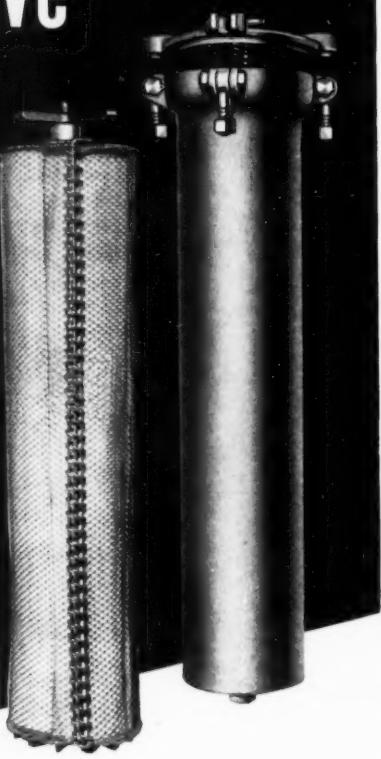


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engineers — Peter J. Reidy, president of the New York Association of Consulting Engineers, and John F. Hennessy, president of the New York Building Congress.

Studies of graft charges had revealed that delays in the issuance of Certificates of Occupancy frequently had been used as a way of collecting graft, according to New York newspapers.

The committee now has filed a report with the City Council. This report suggests means of expediting the issuance of occupancy permits.

Under the present New York laws, an architect, engineer, or superintendent of construction applies to the Buildings Department for a certificate. Before this certificate can be issued, the Department requires approval of the completed job by two or more building inspectors, plus approval from the Fire Department and the Department of Air Pollution (for certain equipment).

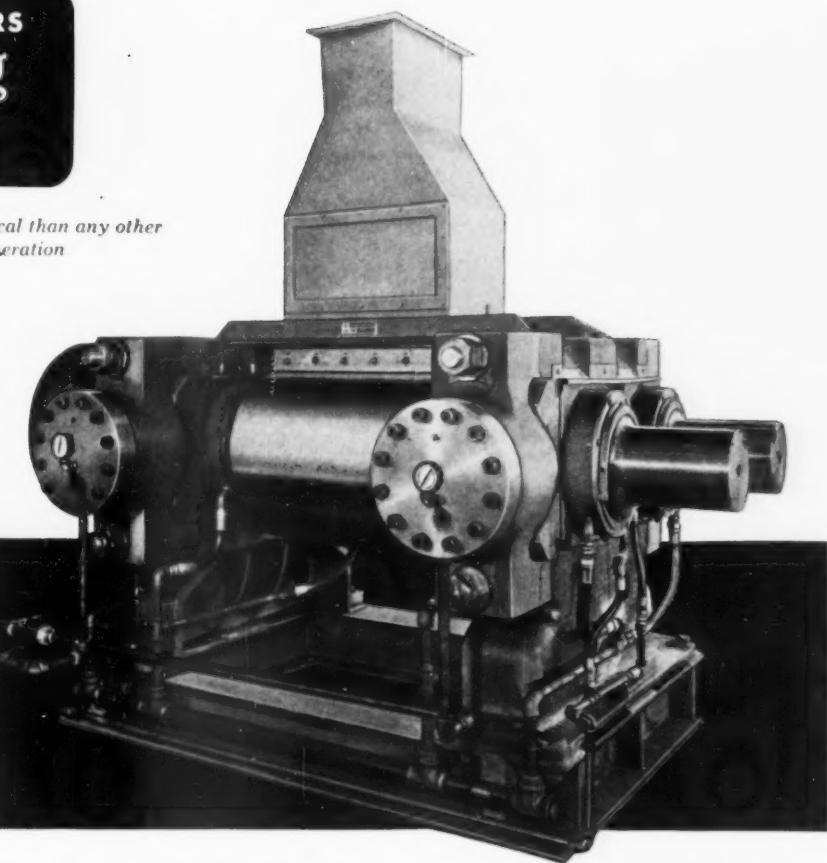
The resulting delays are costly to the builder and to the building owner, as well as to the City (because of lost taxes) and to tenants, who are unable to move into the buildings.

The committee first tried to determine whether application privileges should be limited to architects and engineers. They found that architects and engineers generally are not employed in small construction or alteration work except to prepare and file plans. The members found that in the small jobs, a requirement that an architect or engineer file for the certificate would work a hardship on everyone concerned — on the builder and owner because of time delays, and on many architectural and engineering firms because they could not afford to take the time for the fee involved.

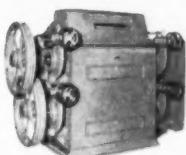
The committee recommended that superintendents of construction should be allowed to file for these certificates. These superintendents would be required to pass an examination, and their certificate allowing them to file

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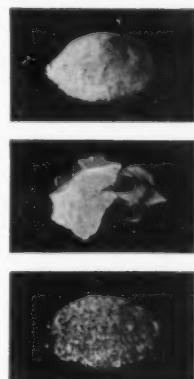
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for occupancy could be revoked for cause.

The superintendent would be allowed to file only for one or two family dwellings, for small commercial structures, and for minor alterations.

Steps also are being taken to eliminate inspections by the Fire Department and the Department of Air Pollution Control.

This was the first study assigned to the Mayor's Committee, which is pointed in the direction of long-range reform.

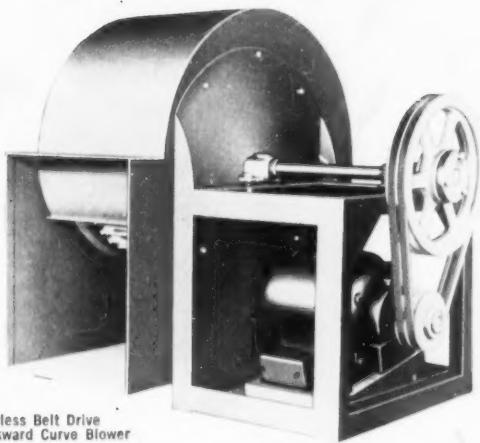
The American Institute of Consulting Engineers elected new officers at the January 13, Annual Dinner meeting. Officers elected are: president, Herschel H. Allen, senior partner, J. E. Greiner Co., Baltimore, Md.; vice president, Richard H. Tatlow III, president, Abbott, Merkt & Co., Inc., New York City; re-elected as vice president, Ellis E. Paul, partner, Howard, Needles, Tammen & Bergendoff, New York City.

Mr. Allen succeeds Edward H. Anson, senior vice president, Gibbs & Hill, Inc.

An exploratory meeting will be held in Lansing, Mich., prior to the National Society of Professional Engineers general spring meeting this month, to determine the possibilities of a joint NSPE-Committee on Engineering Laws committee being formed.

The Committee on Engineering Laws is an organization that fosters the practice of engineering through corporations. Heads of various NSPE committees will meet with the CEL representative to see what, if any, mutual problems the two groups have.

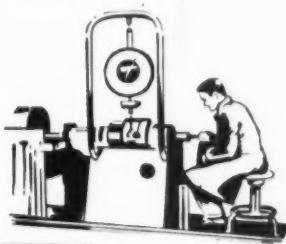
Named to the CEL committee are R. A. Blackburn of Pittsburgh, former president of the Pennsylvania Society of Professional Engineers, chairman of the group; J. H. Foote, (of Jackson, Mich.) vice president, Commonwealth Services Inc., New York City; Dr. Vernon P. Jensen, comptroller, C. F. Braun & Co., Alhambra, Calif.;



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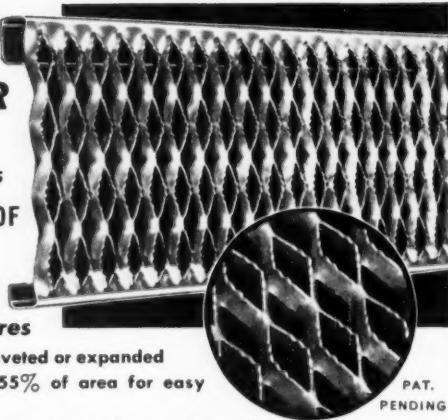
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M. P. Anderson, vice president and chief engineer, Brown & Root Inc., Houston, Texas; and J. K. Gannett, vice president and director of engineering and research, Austin Co., Cleveland.

A trend toward increased technical division emphasis is shown by the ASME schedule of national meetings and conferences for this year.

The Society is sponsoring, or co-sponsoring, 24 major events this year, making the heaviest schedule in ASME history.

Reason for the increased emphasis on technical subjects is "a result of the increased complexity of subject matter in virtually all fields of engineering."

At a meeting in New Brunswick on Jan 10, the New Jersey Society of Professional Engineers board adopted a budget of more than \$59,000.

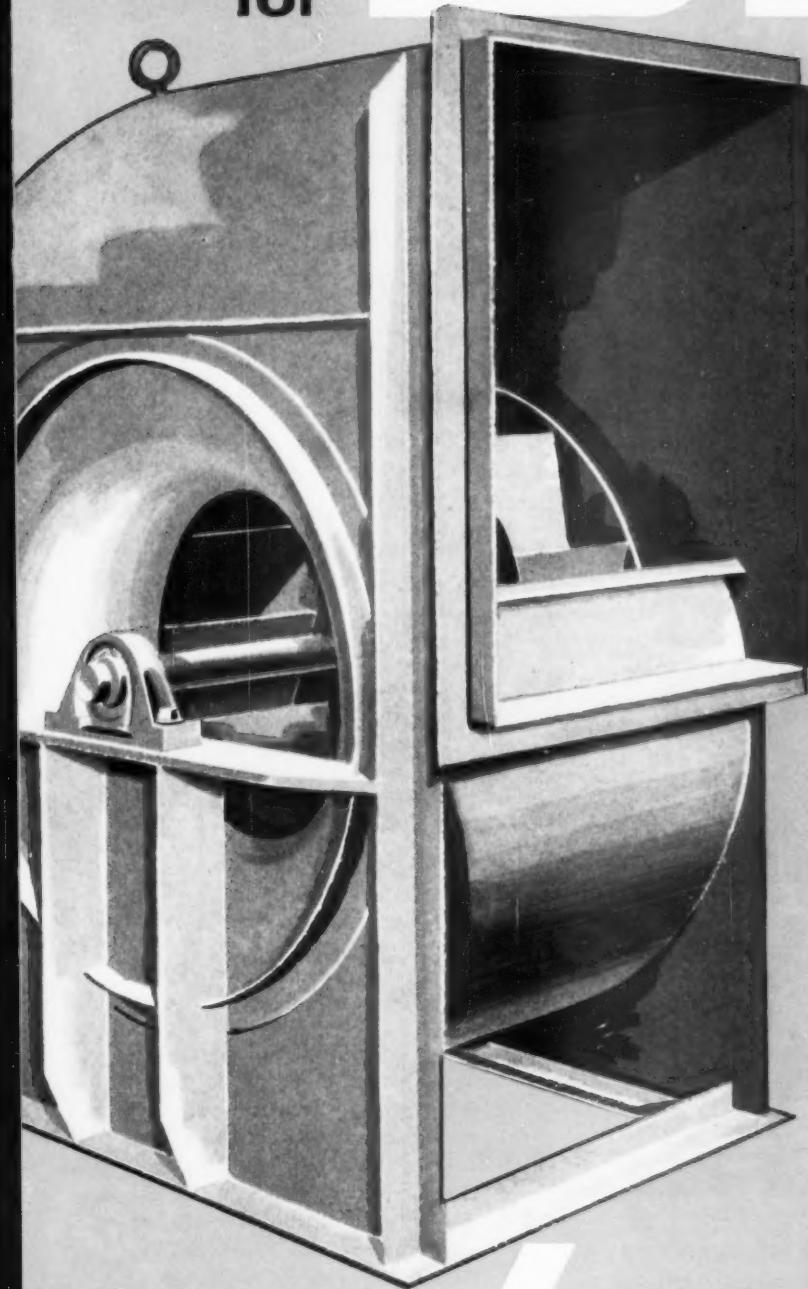
The New Jersey group announced annual convention plans for April 25 and 26 at the Hotel Ambassador, Atlantic City.

Dr. Clark A. Dunn, National Society of Professional Engineers vice president in charge of education, says President Eisenhower's plan for 10,000 undergraduate scholarships annually for the next four years is no solution to engineering-scientific manpower problems. He pointed out that tuition does not cover the costs of educating a student.

"While the reported plan does call for some small aid to graduate schools, it does not provide any aid for the colleges to meet the added costs which will result from the 40,000 students," Dr. Dunn concluded.

The first step toward the formation of a Wisconsin Association of Consulting Engineers was taken at a dinner meeting in Madison on November 29. Eleven Wisconsin consultants heard CEC President Ed Wolff and Minnesota Director Tom Roche explain

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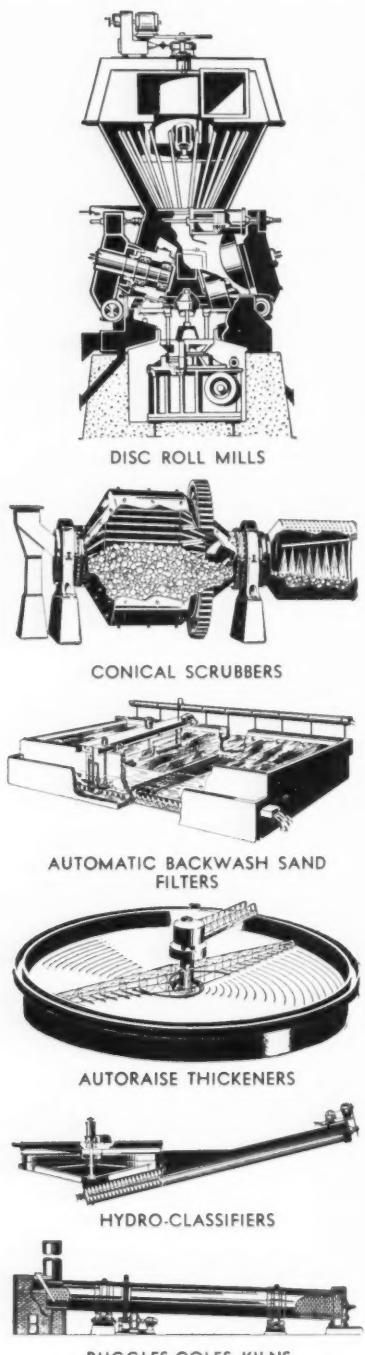
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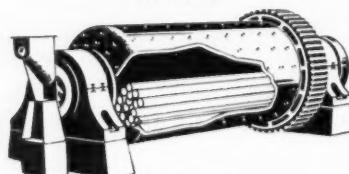
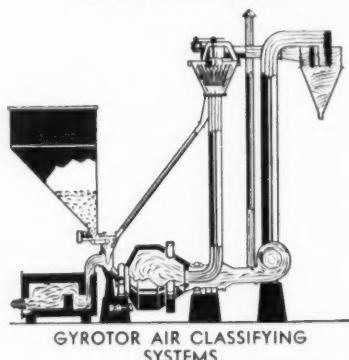
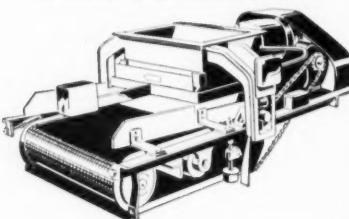
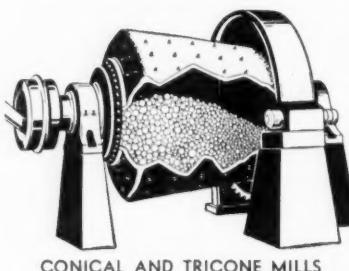


Ask for Bulletin 100-A-64 describing complete line.

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the Consulting Engineers Council and its role in bringing together the state and regional associations of consulting engineers.

John A. Lofte, of Milwaukee, was elected temporary president of the Wisconsin Association, and G. A. Rowland, Wisconsin Rapids, became temporary secretary.

The American Standards Association, in 1955, approved a thorough standard on recommended practice for drainage of coal mines.

Now, a short two and a half years later, the Bureau of Mines, United States Department of the Interior, has the booklet ready for circulation.

The booklet describes gathering pumps, permanent pumps, piping for pumps and in operating pumps, storing mine water, natural drainage, and unwatering abandoned workings. It also recommends metals and alloys with acid-resisting qualities.

The Engineers Joint Council and the American Institute of Architects began the new year by holding an exploratory meeting to work out some of the details of their new joint committee.

AIA spokesmen have indicated that they have high hopes that the joint group will result in the combining of other joint committees, thus accomplishing the same results with a few million less committees and meetings.

The early session tends toward an organization with task committees handling working assignments, with the joint EJC-AIA acting as an executive group for the engineers and architects.

The Metallurgical Society of the American Institute of Mining, Metallurgical, and Petroleum Engineers has a new publication of official transactions. The first issue was published last month.

For many years, all Metallurgical Society transactions were published in the monthly *Journal of Metals*. The number of transac-



# How do YOU lay out the heating and ventilating for today's new schools?

**Who, ME?**



**E**very schoolhouse architect and consulting engineer has probably heard about the sizable reductions in school building costs that have been effected by the introduction of the Nesbitt Series Wind-o-line System of heating, ventilating and natural cooling.

Not all are completely familiar with the layout and application of this unique system—which offers the highest standard of classroom thermal comfort of all such systems *plus* savings of 20% or more of the construction, equipment and installation costs entailed by the conventional system with pipe trenches and runouts.

Nesbitt is most anxious for you and any of your staff to be acquainted with the new and different, but not difficult procedures employed in the layout of the Nesbitt Series Wind-o-line System. We not only offer catalogs and engineering data, but we invite correspondence, and will even arrange conferences in your office, if desired. Thus, your clients can come to know the satisfaction and economy—and you, the good will and prestige—that result from the installation of Nesbitt Series Wind-o-line.

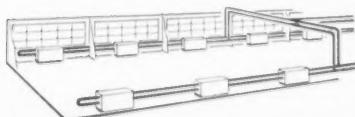
Write us your questions, ask for Publications 104 and 114, or tell us when a Nesbitt representative may see you.

## Nesbitt SERIES WIND-O-LINE SYSTEM

MADE AND SOLD BY JOHN J. NESBITT, INC., PHILADELPHIA 36, PA.  
*Sold also by American Blower Corporation and American-Standard Products (Canada) Ltd.*

### WHAT IS THE NESBITT SERIES WIND-O-LINE SYSTEM AND HOW DOES IT SAVE MONEY?

The system includes a Nesbitt Syncritizer unit ventilator in every classroom, with Wind-o-line finned radiation installed along the sill.



The Wind-o-line copper tubing takes the place of the usual supply and return mains. Two-pipe direct or reversed return circuits are used, with a group of classrooms or even an entire wing of the building in a single circuit. Each classroom is individually controlled.

The Syncritizer multipass heating element extracts the required heat from a smaller quantity of water. System water temperature is automatically varied with outside temperature.



Since Wind-o-line is the main, costly pipe trench, individual runouts and pipe covering are eliminated. Remaining mains are smaller and shorter.



Since only one-half to one-third the usual amount of hot water is circulated, smaller, less costly pipes and pumps are used.

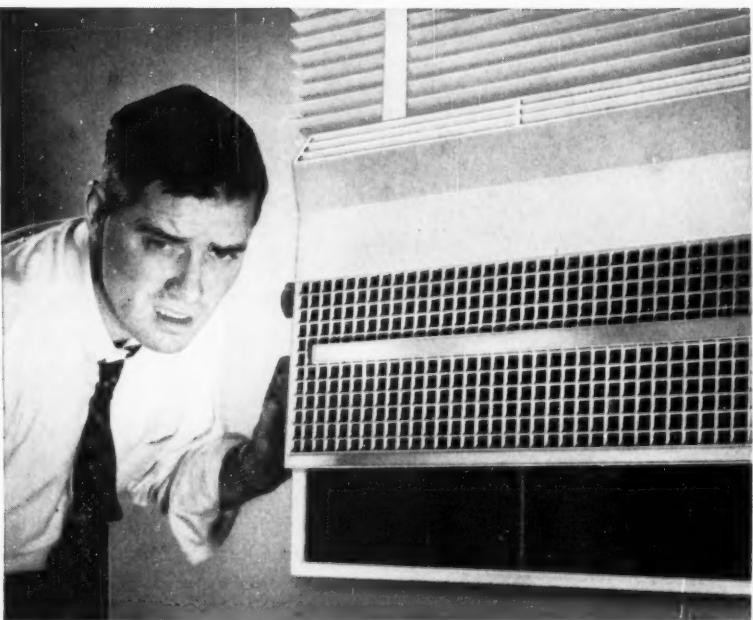
Packaged piping within the Syncritizer—crossover tubing, expansion loops, balancing valves, etc.—saves expensive jobsite fitting.



Wind-o-line protects against window downdraft and cold surfaces for as long as necessary, thus completing the protected learning environment.

Wind-o-line gravity heat gives overnight temperature protection without other special controls.

Total savings enable even low-budget schools to have the last word in heating and ventilating.



## GO AHEAD... explain nuisance tripping to him

Heat's on, conditioner's out. How come?

Some annoying power interruptions are due to inadequate wiring. A vast number are due to nuisance tripping of circuit breakers or nuisance fuse blowouts.

Fuses and many circuit breakers operate on the basis of heat. They are sensitive to heat from within the circuit and without. Thus, on hot days thermal protectors are often near the tripping point even though the circuit is not fully loaded. As heat builds up, nuisance tripping results.

Heinemann hydraulic-magnetic circuit breakers *ignore heat*—respond only to *current* (amperage) which is the true determinant of electrical load. These circuit breakers will carry the full, safe capacity on the hottest days. Nuisance tripping just doesn't occur.

In Heinemann circuit breakers, actuation is entirely magnetic; inverse time delay is provided by hydraulic means. When protection is needed, interruption is fast. When the circuit is safe, power stays ON.

For consulting engineers, the full story is given in an informative booklet, Manual 101: "What You Should Know About Circuit Breakers." Write for your copy.

**HEINEMANN**

HEINEMANN ELECTRIC COMPANY  
127 Plum Street, Trenton 2, N. J.

*Circuit breakers*



tions requiring publication increased so much, however, that it was felt that a separate magazine was needed.

The *Journal of Metals*, which will have more space for news stories and features, still will be sent to Metallurgical Society members as part consideration for their dues.

The *Transactions of the Metallurgical Society of AIME*, a bimonthly, will be \$5 a year to members, or \$20 a year to non-members.

World interest in Russia's scientific and engineering developments and this country's concern over its own progress in these fields will be highlighted at the American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME) convention Feb. 15-19, in New York City.

More than 4500 persons are expected to attend the convention, which will be held in the Statler and Sheraton-McAlpin hotels.

The Russian situation will be discussed by The Metallurgical Society of AIME on the afternoon of February 19. The domestic situation in oil, present and future, will be the primary topic of the Society of Petroleum Engineers of AIME.

An annual savings of \$3 million in the chemical industry alone is possible as a result of a program recently authorized to develop heat exchanger standards.

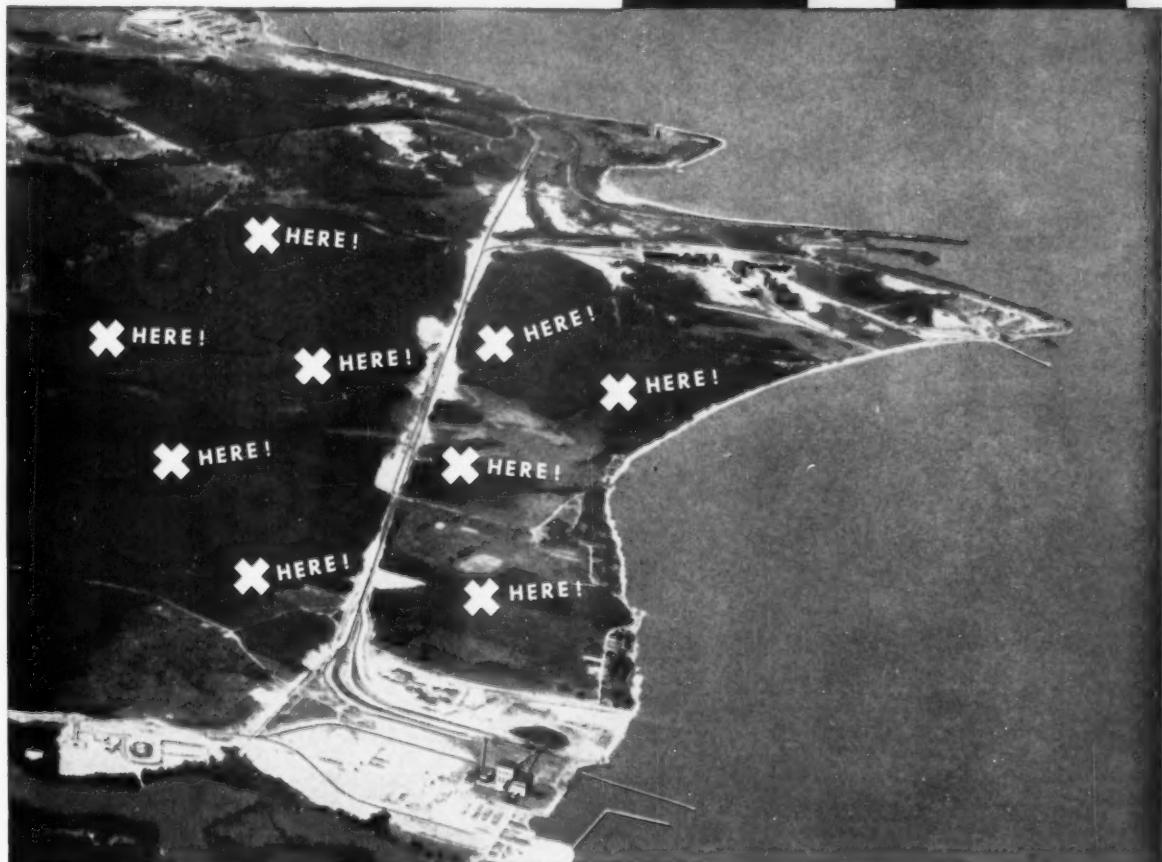
The program, established by the American Standards Association, will cover heat exchangers of the following types: fixed tube sheet with or without a shell expansion joint, U-tube, internal floating head, outside packed floating head, and the kettle-type reboiler.

The standards will be designed to furnish an efficient method for engineers preparing specifications covering exchangers and also will act as an aid to manufacturers in reducing design and inspection time.

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**Contractors:** L. C. Anderson & J. J. Cravolini, Tucson, Arizona



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Creative design and functional efficiency need not be hamstrung by budgeted dollars. Nor must structural and enduring qualities be compromised for economical construction.

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For curved structures like this, these lightweight, high-strength, cellular steel panels require minimum supports, and brace the steel arches at the same time. Notice the clean, uncluttered ceiling lines.

And *inside the panels*, just above the perforations, is a pre-formed, arched, sound-absorbing batt † which effects noise reduction coefficients up to 80%. The ceiling can be washed or painted without affecting acoustical qualities.

Write for FREE Fenestra Building Panel Catalog, or call your Fenestra representative. Fenestra Incorporated, Department CE-2, 3443 Griffin Street, Detroit 11, Michigan.

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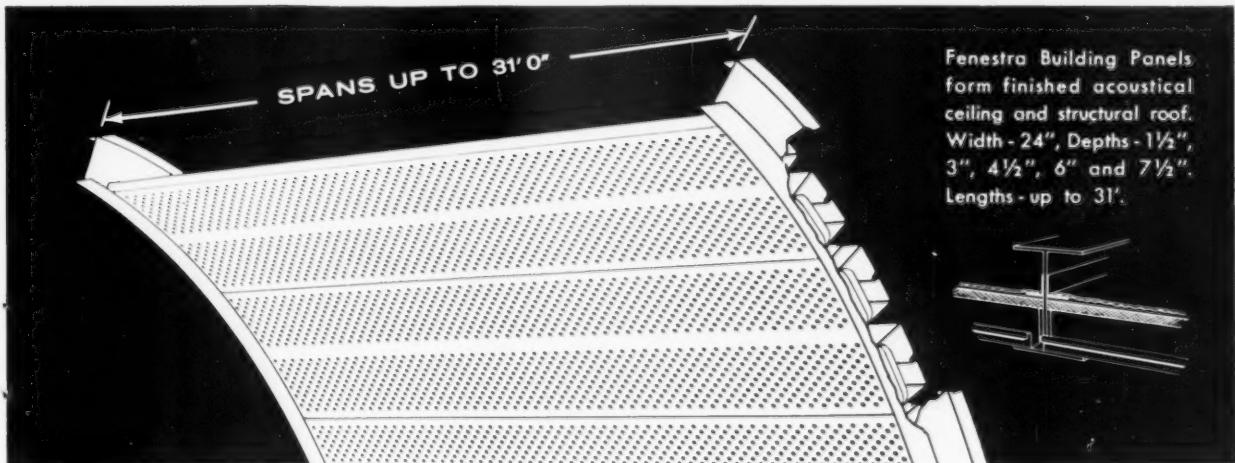
# Fenestra

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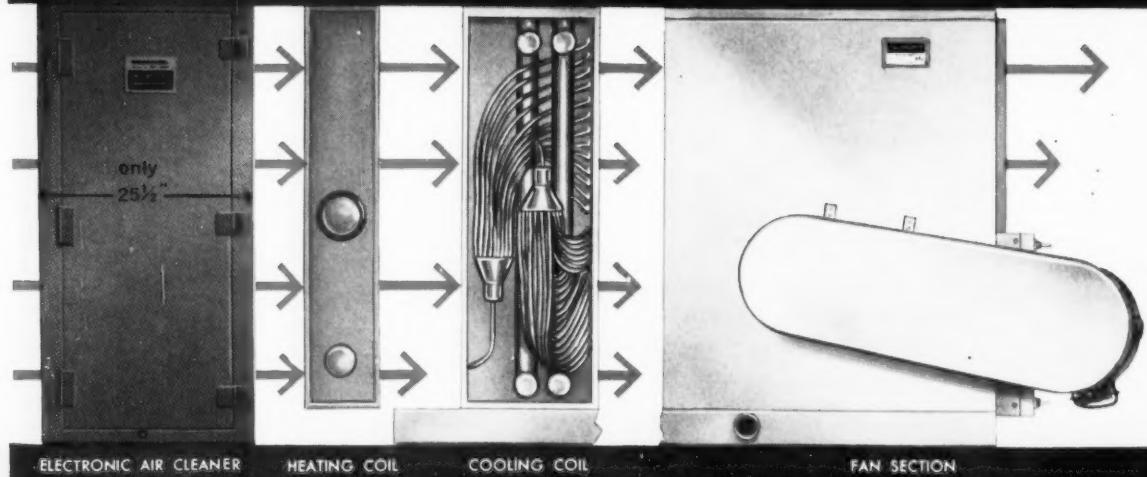


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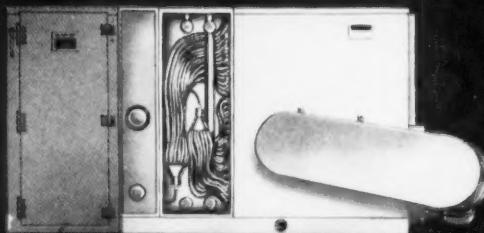
Westinghouse Electronic Air Cleaner Sections for "In-Line" Assembly . . . 25 1/2" in direction of air flow . . . no additional access space required!

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## Report from the West Coast

RALPH S. TORGERSON

CONSULTING ENGINEER CORRESPONDENT

AN ANNOUNCEMENT by the County Engineer of Los Angeles County offering the services of his staff to the smaller municipalities has alarmed the consulting engineers of California. A considerable number of consulting engineers derive a substantial part of their income from work for small municipalities, many of which do not have a city engineer or engineering staff and rely on consultants for engineering work. The announcement by the Los Angeles County Engineer did not list a fee schedule.

If this encroachment into private practice were to go unchallenged, a precedent could be established that might well lead to a further invasion into other fields of activity affecting private business. The Consulting Engineers Association of California has placed this problem on the agenda of its Annual Meeting for discussion and appropriate action.

### City Offers 25 Services

The problem has become complicated, for Los Angeles now provides, under agreement with certain cities, about 25 services, including building inspection, mapping, industrial waste facility inspection, and the design, construction supervision, and maintenance of sanitary sewers. This trend toward incorporation of communities into the larger cities has been accelerated by the use of the General Services Agreement, which is provided for under the Government Code and County Charter. Under this provision, cities are permitted to contract with the county for one or more government services.

When a county offers its engineering services to cities, there is always an implication that the County Engineer's office is overstaffed. Los Angeles taxpayers recently became so wrought up over their tax bills that tax officials were swamped with complaints and a call was sent out by taxpayers for a

mass meeting. An investigation into these expanding activities, which might normally be done by the smaller municipalities through private professional services, may reveal one way to cut taxes.

### Design Contracts

Consulting engineers on the West Coast who have contracts for the design of Federal government structures are considerably concerned because these contracts do not include any provision for field inspection by the designer. Fees do not allow for field inspection compensation. Field inspection of structures usually is being done by young government engineers having little or no experience in this work.

One well-known structural engineer, whose firm has several design contracts for government structures, has become so worried about the lack of adequate field inspection that he has personally checked work in progress without any compensation. His inspections revealed serious deviations from the plans which, if not corrected, could have resulted in dangerous construction. It is his conviction that engineers without any actual experience in structural work cannot do a good job of inspection.

### Public School Fees

A resolution recently was passed by the Board of Directors of the Consulting Engineers Association of California covering the question of a standard subcontract between architect and engineer for services in connection with the design of school buildings. The resolution held that competitive bidding for architectural or engineering services could not be in the public interest and that to preclude the possibility of secondary competitive bidding, all agreements entered into by public bodies should set forth the portion of the total fee that the prime contracting party should pay to architects or consulting en-



## Hydro-Filter Highlights of: DUST CONTROL DOINGS

### Dust Control problem of light bulb manufacturer is brought to light

#### The Problem:

A leading manufacturer of light bulbs wanted to build a new manufacturing line but was plagued by problems they had experienced with an existing wet scrubber. No wonder . . . powdered glass, broken bulbs, colored ceramic frit, alcohol and resins are used in the process and the line must operate 24 hours a day—7 days a week. A shutdown on the dust collector would mean a shut-

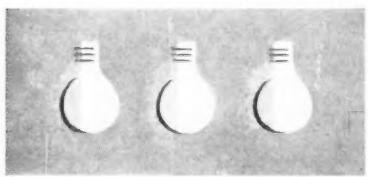
down for the entire operation because of dust and noxious fumes. As a result, only two scrubber manufacturers would bid on the job.

#### The Solution:

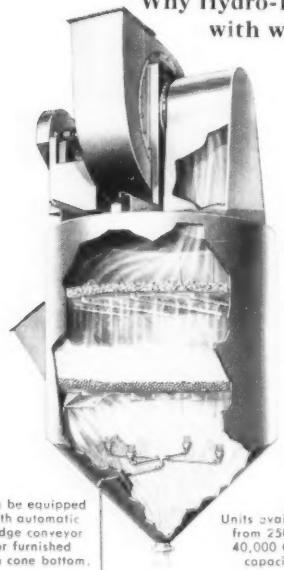
A type I Hydro-Filter with automatic sludge conveyor was selected for the job after customer evaluated evidence of its efficiency on the basis of (1) ability to operate at rated efficiency over prolonged periods at heavy dust load; (2) ability to operate over prolonged periods without shutdown for maintenance.

#### The Result:

Hydro-Filter did the job, and more. After 6 months operation the company ordered their second Hydro-Filter.



#### Why Hydro-Filter combines exceptional efficiency with welcome ease of maintenance:



Air, water and glass spheres do the work in Hydro-Filter. There are no moving parts in the collection area. No baffles; nothing to load up and no "dead" areas to make cleaning a chore and efficiency a myth. The relatively simple design permits economical use of special materials of construction. It is designed to operate on dusts, sprays, fumes, and mists and can be equipped for recirculation of the liquid scrubbing medium.

Hydro-Filter will maintain a constant high level of efficiency over wide variations in volume of air and heavy dust loads. And because of its simple design, it will provide ease of maintenance unmatched by any equipment for similar use.

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TIRED OF DUST COLLECTOR MAINTENANCE?  
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National Dust Collector Corporation

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gineers that may be engaged by them for the project.

President Ralph Westcott also presented a tentative draft of a suggested rule of procedure to be followed by members when requested to submit a quotation for engineering services. The proposed rule of procedure for handling competitive fee bidding was discussed at the monthly meetings and held over for final action at the Annual Meeting.

The Consulting Engineers Association of California authorized Executive Secretary Pecos Calahan to apply, in the name of the Association, for associate membership in the International Conference of Building Officials. This organization formerly was called the Pacific Coast Building Officials Conference. It also was voted to have the Association participate in Engineers' Week activities in the Los Angeles and San Francisco areas in February, 1958.

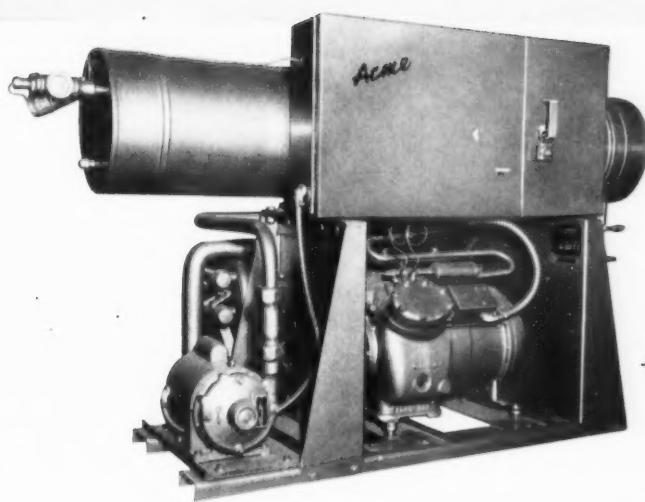
#### Northwest Activities

Consulting engineers in Oregon and Washington have a considerable backlog of work in spite of a drop-off in timber industry activity. In addition to local projects, several engineers in this area have contracts for government work and private projects in Alaska. The work involves such diverse activities as municipal water supply studies, big hydroelectric dams, and power plants.

The Consulting Engineers Association of Oregon has undertaken a continuing study of engineering fees. This study has been particularly helpful to the consulting engineers who have not had the background of long experience. Many of these engineers had not been aware of all the services required to do a good job of engineering and had been inadequately compensated by the fees they charged. The study has resulted in a better understanding of the cost of good engineering services.

At the next session of the Oregon legislature, bills will be introduced to amend the Engineer-

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**FLOW-COLD®**



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The Flow-Cold's components—Dry-Ex® chiller, condenser, heat exchanger and super quiet, accessible-type, hermetic compressor — are tops for advanced engineering . . . proven performers! Flow-Cold chillers are

complete packages . . . all piping and wiring factory-installed and tested in operation. All necessary controls are furnished . . . now fully enclosed to stop unauthorized tampering. And Flow-Cold chillers are not only factory tested, they're certified . . . a "first" among chiller manufacturers.

Now add the Flow-Cold's newly streamlined wiring and piping, neat, pre-formed pipe insulation and inherent compactness of Acme's Flow-Cold design . . . and you have a chiller that's just as good looking in an installation as it is efficient and economical to operate.



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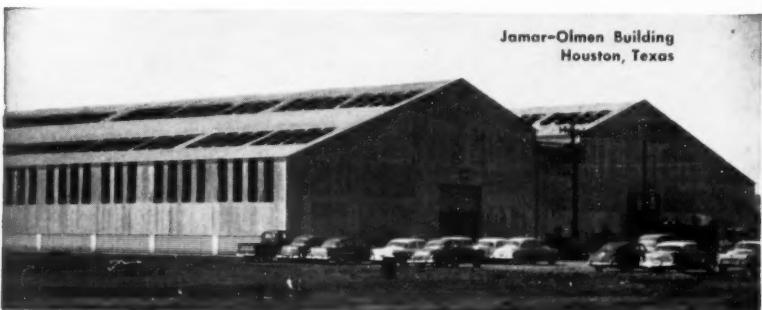
This lighting cost analysis by an independent consulting engineer reveals the money actually being saved in one metal building through the use of Corrulux daylighting panels in place of artificial lighting. Comparative costs of both methods are projected over a ten-year period, indicating a savings with Corrulux of over \$58,000.00.

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ing Registration Law, tightening up provisions governing the licensing of professional engineers. The Consulting Engineers Association of Oregon is participating, with the Professional Engineers Association of Oregon, in a resurvey of the law by the Oregon Board of Engineering Examiners.

While there is some divergence of opinion on the subject, an effort will be made in the next session of the Washington legislature to introduce an acceptable bill providing for incorporation of engineering firms. Some of the opposition to incorporation came from those who believed that it would open the State to more competition from out-of-the-state engineering firms.

#### Associated Freeway

The names of the participating engineers in Associated Freeway Consultants, organized to meet the need for a professional team of engineering consultants capable of handling any or all design contracts related to the Tacoma-Seattle-Everett Freeway, are: Carey and Kramer; Ruskin Fisher and Associates; Walter S. Gordon; Hammond, Collier and Isaac; Harmon-Pray-Detrich; Peter H. Hostmark and Associates; Jepson and Styer; Johnson and Duncan; Marshall, Barr and Associates; Metcalf and Johnson; James B. Notkin; Bruce C. Olsen, Harry R. Powell and Partners; Oleg A. Price; Donald G. Radcliffe; Victor K. Schegolkov; Sitts and Hill; E. L. Strandberg; Paul Thiry; and Horace J. Whitacre and Associates. An attractive brochure has been prepared showing the engineering qualifications, experience, and facilities of the participating consulting engineers.

#### CEAC Meets

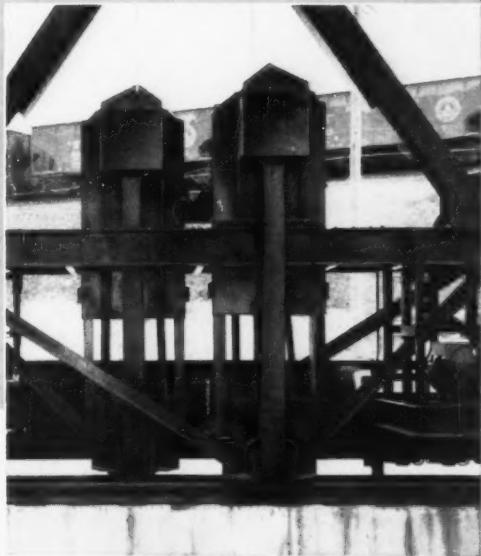
The Consulting Engineers Association of California held its fifth annual meeting at the Miramar Hotel, Santa Barbara, Calif. The program included a Board of Directors' meeting Saturday, Jan. 18, and also golf and sightseeing



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Dravo Rail Clamps provide positive clamping of the unloader to its runway rails and will hold in winds having velocities over 100 miles per hour. No adjustments necessary to keep clamps in working order.

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Dravo-designed Automatic Rail Clamps provide positive clamping and never need adjustment. Many other such features result from the fact that . . . Dravo bulk materials handling equipment is individually designed to handle each specific job economically, dependably and safely. Such performance is achieved by bringing together the customer's operating knowledge and the experience of Dravo's research,

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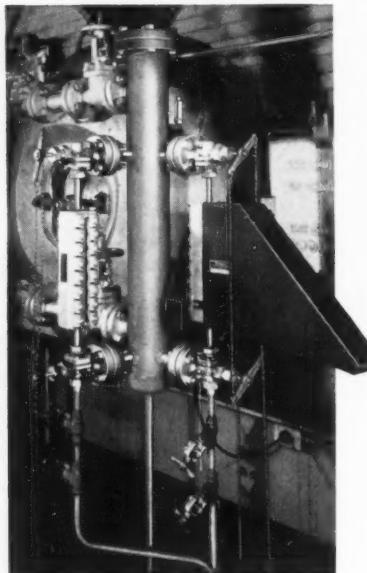
This method has resulted in high efficiency unloaders and other bulk materials handling equipment that produce because they are tailored to fit the job. Dravo engineering features, built into every structure, provide for low maintenance and operating costs. For complete information on unloaders or ore bridges write to Dravo Corporation, Pittsburgh 25, Pa.

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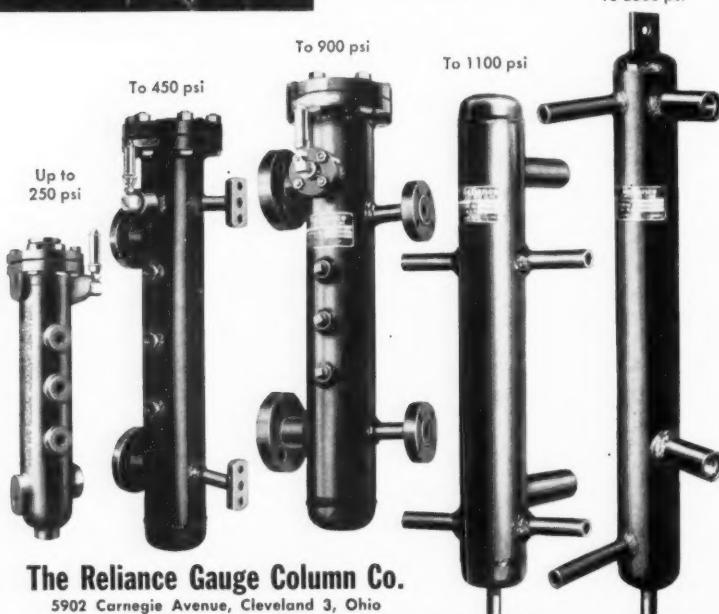
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**BOILER SAFETY DEVICES**

for members and their wives. Sunday, Jan. 19 was left free for golf or other activities with a get-acquainted dinner in the evening. Monday, Jan. 20 was devoted to a luncheon at which Hunter Hughes, Editor, CONSULTING ENGINEER, was the speaker. This was followed by a business meeting in the afternoon with the annual banquet in the evening.

## Study Colorado Law

The Professional Engineers of Colorado legislative committee is making a study of the state law currently regulating the practice of engineering.

This Colorado law was enacted in 1953. The legislative group felt that a few years of experience with the law was necessary before proposing any changes.

A letter, asking for comments on the law, has been mailed to engineers registered in Colorado.

## Corporate Trouble in Idaho

Meanwhile, out in Idaho the Board of Engineering Examiners has filed suit in a state court to prevent completion of a state-sponsored engineering contract because the contract is with an incorporated firm.

The board stated that the State Highway Department and its officials acted illegally in signing a contract with the Karl F. Tuttle Engineering Company, Inc., of Alameda, Calif., for \$120,046 worth of engineering work on interstate highways.

A court brief says corporations cannot practice in the state, and adds that the contract omitted the word "incorporated" in the name of the engineering firm.

Forewarned of the court action, the state treasurer has held up payments of more than \$50,000 to the Tuttle organization.

To further complicate the situation, the Karl F. Tuttle Engineering Company, Inc. has merged with another firm to become "Tuttle Engineering Inc., Architects and Engineers," since the court action began.

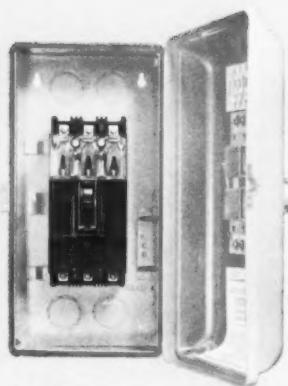
*from Westinghouse*

# LOOK

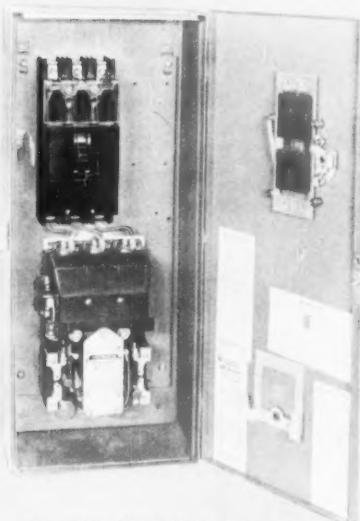
**the contacts are visible!**

**SAF-T VUE**

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In AB-I Breakers



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### *Safe, Sure, Protection*

They're calling it "the biggest thing in circuit protection since Westinghouse developed the breaker!" You can *see* the contacts are open, or closed, through the heat-resistant thermoplastic window. Yet the breaker is still dead-front, with no exposed live parts.

What's more, the transparent window won't cloud during repeated full-load switching or interrupting—won't cloud even on normal overload interruptions.

In case of a high-value short circuit, the Saf-T-Vue breaker window clouds immediately—giving you visual warning of serious trouble on the line. In this rare instance, the transparent window can be easily and inexpensively replaced.

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### **SAF-T VUE** in Westinghouse

#### *combination Life-Linestarters*

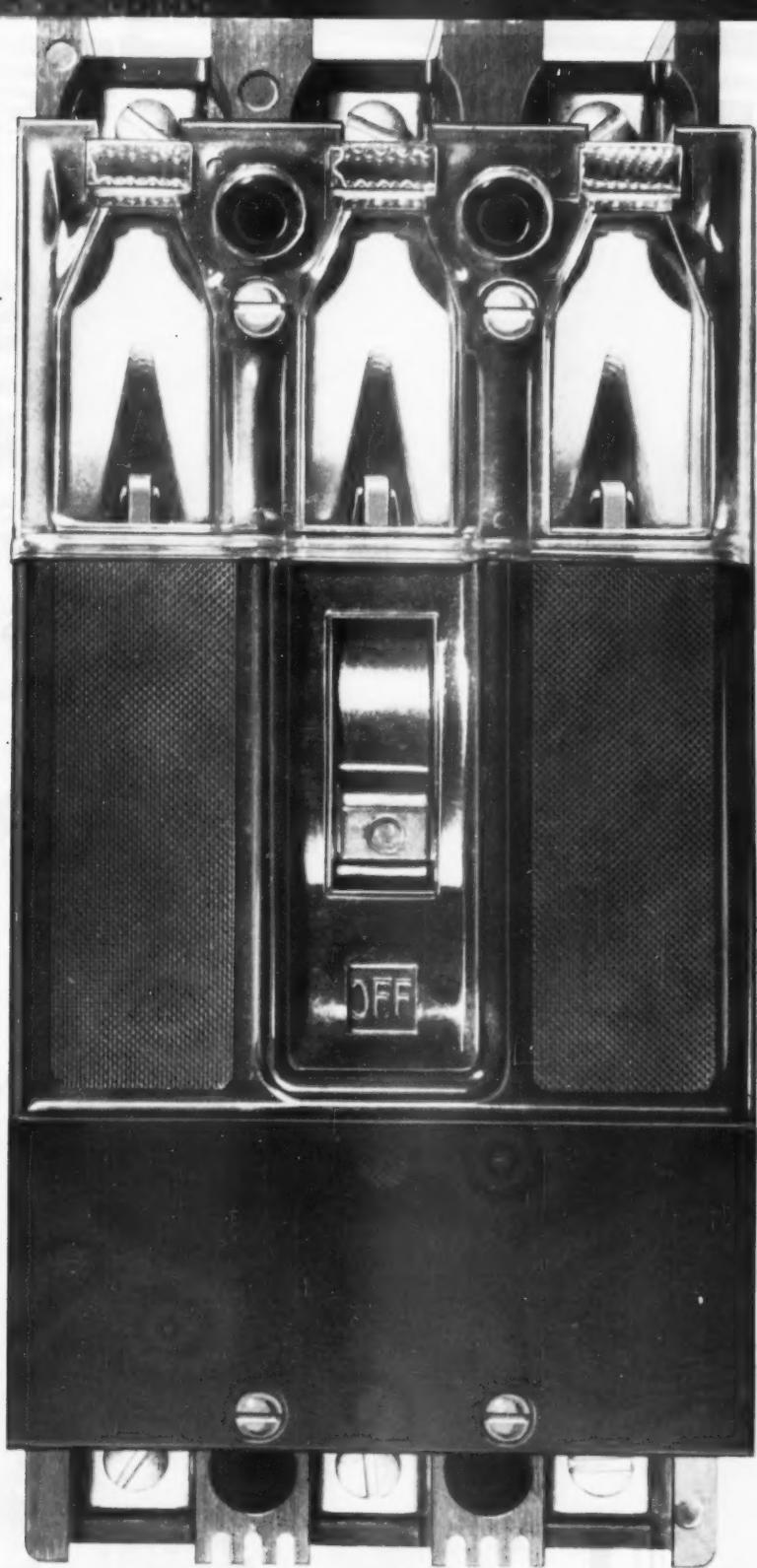
In combination Life-Linestarters\*, too! Saf-T-Vue Breakers add one more "plus" to a long line of Westinghouse exclusive features: all front-removable parts; positive De-ion® arc quencher; bimetallic disc overload relay; knife-edge fulcrum that prevents armature sticking or binding; and many, many more—

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Section of Mahon Metalclad Fire Wall showing Construction Features. Four layers of  $\frac{1}{2}$ " Plaster Board are sandwiched between Roll-Formed Steel Wall Plates. All Joints in both Wall Plates and Plaster Board are Offset.

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## Atoms in Action

IF THE ATOMIC ENERGY Commission is open to criticism for unwarranted secrecy, the same criticism cannot be leveled at Argonne National Laboratory. A "fact sheet" recently prepared for general release by A.N.L. goes into interesting detail. It starts, "Argonne National Laboratory, the nation's senior atomic energy research and development installation, is operated by the University of Chicago, under contract to the U.S. Atomic Energy Commission. Location of the Laboratory is 25 miles southwest of downtown Chicago, and 17 miles northeast of Joliet, Ill. It is across the Des Plaines River from Lemont, Ill., and borders on US Highway 66. Argonne's mailing address is P.O. Box 299, Lemont." If anyone should still have trouble pinpointing the place, the telephone number is Lemont 800.

ARGONNE National Laboratories has been authorized to proceed with design studies for a 12.5-billion electron volt zero gradient proton synchrotron. The project will cost in the neighborhood of \$27 million, and the AEC has made available \$1.5 million for design work. John J. Livingood, Director, Argonne's particle accelerator division, said the synchrotron facilities will cover about 60 acres of the 3700-acre laboratory site. Argonne's avid interest in detailed geography is further evinced by the addition to the news story of the fact that Director Livingood lives at 836 County Line Road, Hinsdale, Ill.

THE U.S. ATOMIC Energy Commission has approved for use in its facilities and those of its contractors new maximum permissible radiation exposures recommended by the National Committee on Radiation Protection and Measurement. A basic revision in the standards is the inclusion of a new provision to limit the total radiation dosage any individual may accumulate beyond the age of 18 to an average of .5 rems per year and not more than 15 rems in any year. In addition to these occupational

exposure limits, the NCRPM made the following picturesque recommendation regarding exposure to the whole population: "The maximum permissible dose to the gonads for the population of the United States as a whole from all sources of radiation, including medical and other man-made sources, and background, shall not exceed 14 million rems per million of population over the period from conception up to age 30, and one-third that amount in each decade thereafter. Averaging should be done for the population group in which cross-breeding may be expected." Down boy, down!

PACKAGED REPROCESSING plants designed to recover uranium, plutonium, and radioisotopes from a single large reactor and located at the reactor site may be the practical answer to fuel reprocessing problems in the near future, according to Charles G. Manly, Chief, Commercial Development Branch, Division of Civilian Application, AEC. The plants would be owned and operated by private firms.

CHARLES G. MANLY, of the AEC, says that some early estimates concerning the timing and rate of growth of nuclear power may have been overly optimistic. He contrasts the optimistic McKinney panel report with the recently released forecast of the Atomic Industrial Forum, which estimates that there will be no significant increase in the rate of power reactor construction in this country until after the mid-1960's. Manly hedges so far as his own opinion is concerned but agrees basically with the AIF estimate that nuclear power will not be economically competitive in this country before 1965.

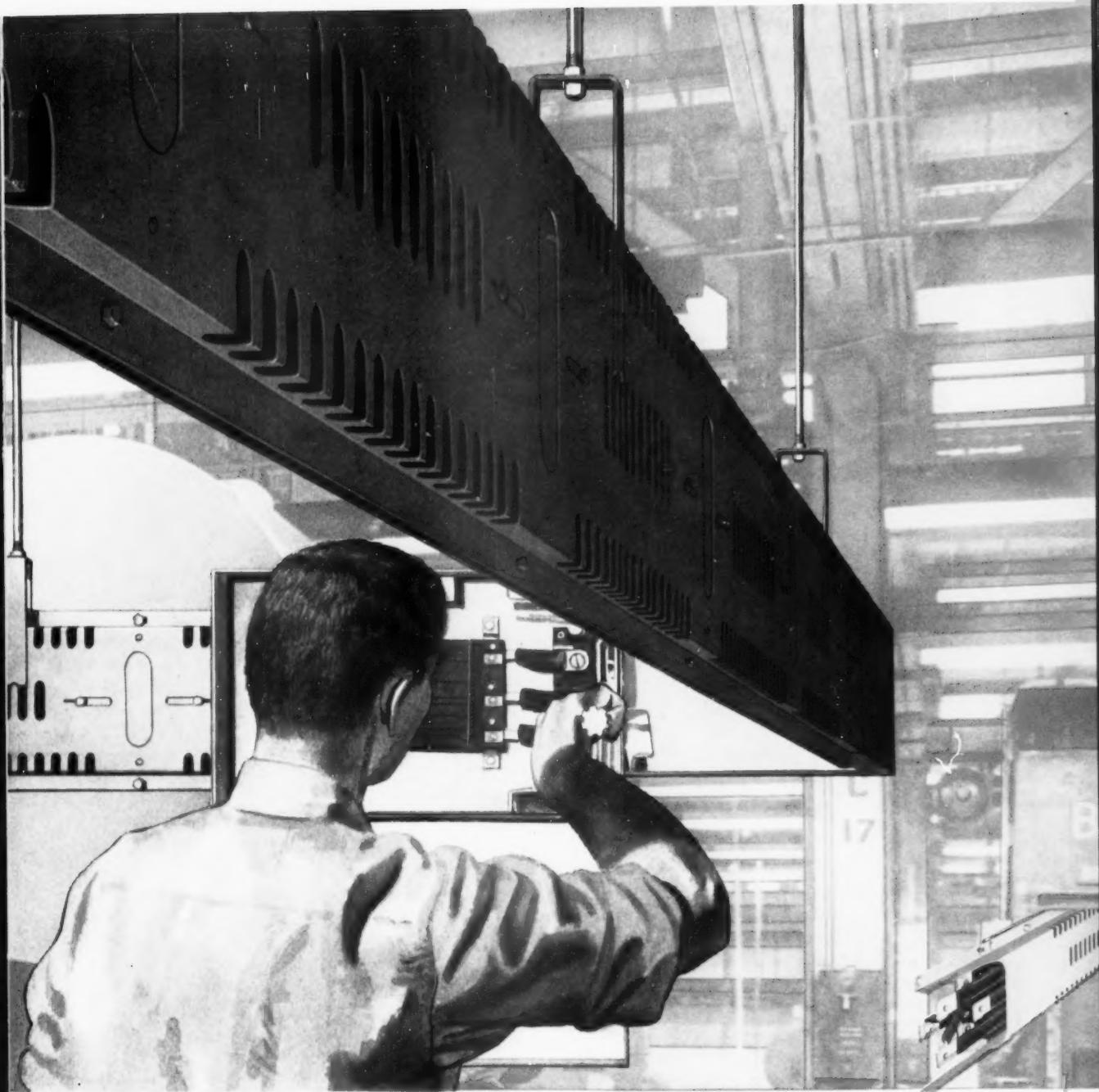
THE ATOMIC INDUSTRIAL FORUM, in its manpower survey for the AEC, "Scientific and Engineering Manpower Requirements for the Atomic Industry," forecasts that the need for scientists and engineers for privately supported atomic energy activities will more than double in the next three years. Estimates for July 1957 indicate that approximately 9000 scientists and engineers were then working either part- or full-time in all types of atomic energy activity supported by private industry. This survey is the first part of a four-part study sponsored by the AEC. The Commission and the American Society for Engineering Education will study the needs of: industry in carrying out work under contract to AEC; universities and colleges and nonprofit research institutions for research and training programs; and the Government for direct employment of atomic scientists and engineers.

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# The Legal Aspect

MELVIN NORD, P.E.

Consultant in Legal and Technical Problems  
Patent Attorney

## Tort Liability of Municipal Corporations

The liability of a municipal corporation for its torts or for those of its agents or servants depends primarily on whether the activity involved can be classified as a governmental or a business function. If it is a governmental function, the municipality is immune from tort liability—having the immunity of the state in this respect. If, on the other hand, the activity is of a business or proprietary nature (one in which an individual or a business corporation could engage), the municipality has no immunity from tort liability.

### Exceptions to the Rule

There are some real or apparent exceptions to this general rule. Municipal corporations are liable for negligence in failing to maintain and repair streets, roads, and highways, even though this may be classed as a governmental function. This exception generally is provided by statute.

Another important exception involves the maintenance of a nuisance or an attractive nuisance—a big hole in the ground, for example, that attracts children. Even if this involves governmental activities, the municipality has no immunity from tort liability. This exception is not generally provided by statute but is part of the common law.

The distinction between governmental and proprietary functions is by no means always obvious, and there is consequently a large body of case law dealing with this distinction.

### Governmental Versus Proprietary Activities

*Ramirez v. Ogden City*, 3 Utah (2d) 102; 279 Pac. (2d) 463, a Utah case decided Jan. 26, 1955, is an example of the difficulty of determining whether a certain activity is governmental or proprietary.

Mary Ramirez sought recovery of damages against Ogden City for personal injuries sustained when her

dress came into contact with an unprotected gas heater and caught fire in the ladies' powder room of the Ogden Wall Street Community Center. The City owned and operated the Center, spending \$6000 to \$8000 per year on its operation and maintenance. It was operated entirely as a public recreational center, all members of the public being free to use it. On the evening in question, the Havana Club, which was giving a dance, had rented the Center for \$15.

The issue was not whether the City had been negligent in leaving an unprotected gas heater in a dangerous place but whether it was immune from liability for its negligence. The City maintained that this was a governmental activity, carrying immunity from tort liability. The plaintiff argued that this was purely a proprietary function since any individual can operate and maintain a dance hall and recreational center.

The court held that it was a governmental function and that the City was therefore immune from tort liability. The Court stressed the fact that the Center was provided as a public service and that no income was derived from it other than normal fees which did not even pay expenses. The fact that the Center had been rented to a private club the evening of the accident was held to make no difference.

It may be added that a survey of other cases of a similar nature show a decided split, some holding the activity to be governmental and some holding the activity to be proprietary.

### Sewage in the Basement

*City of Holdenville v. Moore*, 293 Pac. (2d) 363, an Oklahoma case decided Jan. 31, 1956, involved an action against a City for property damage caused by the backing up of sewage from the City's main sewer line into Moore's basement, in which he had



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kept carpets and household supplies. The evidence indicated that the City had been negligent in allowing the sewer to become clogged with roots and other materials, which caused the backing up of the sewer. Moore sued for \$1000 damages.

The City argued that operation and maintenance of a sanitary sewer system is a governmental activity, and that it was therefore immune from liability for its

negligence. The Court held to the contrary, however, holding this to be a proprietary activity, and as such carrying no immunity from tort liability.

#### Must Keep in Good Repair

This problem has arisen in many courts and, while there are some decisions to the contrary, the majority of decisions are in accord with this holding. It is generally held that a municipality is under

no duty to construct sewers and that it is not liable if it provides sewers which turn out to be undersized. However, if it provides sewers, it assumes the duty of keeping them in good repair. That is to say, it is liable for negligence in failing to keep them in good repair and there is no immunity from liability, since this is regarded as a proprietary function.

Thus, maintaining a recreation center which is rented out to private parties is a governmental function in most states, while maintaining a sewer is a proprietary function in most states. On the other hand, in some states maintaining a recreation center is a proprietary function and maintaining a sewer is a governmental function . . . And that is why there are so many lawyers.

#### Roads, Streets, and Highways

*Hall v. Town of Keota*, 79 N.W. (2d) 784, an Iowa case decided Dec. 11, 1956, involved a suit by the father of a child killed when a heavy cast iron post, used by the Town of Keota to carry a "No U-Turn" sign, fell on him.

The plaintiff alleged that the pole was not kept in good repair and safe condition; that the bolts and nuts anchoring it had become worn and rusted so as to be useless for supporting the pole.

To the charge of negligence, the City replied merely that it was immune from liability, since this was a governmental action.

The Court held: (1) that the maintenance and repair of streets is a governmental function; (2) that a sidewalk is a part of the street; but (3) that, by statute, municipal corporations are given the duty to keep the streets in repair and that this destroys their immunity and renders it liable in damages for negligence. Thus, the City could not escape liability in this particular case.

#### Hole in the Ground

*In Nicholson v. City of Des Moines*, 60 N.W. (2d) 240, an Iowa case decided Sept. 22, 1955, the is-

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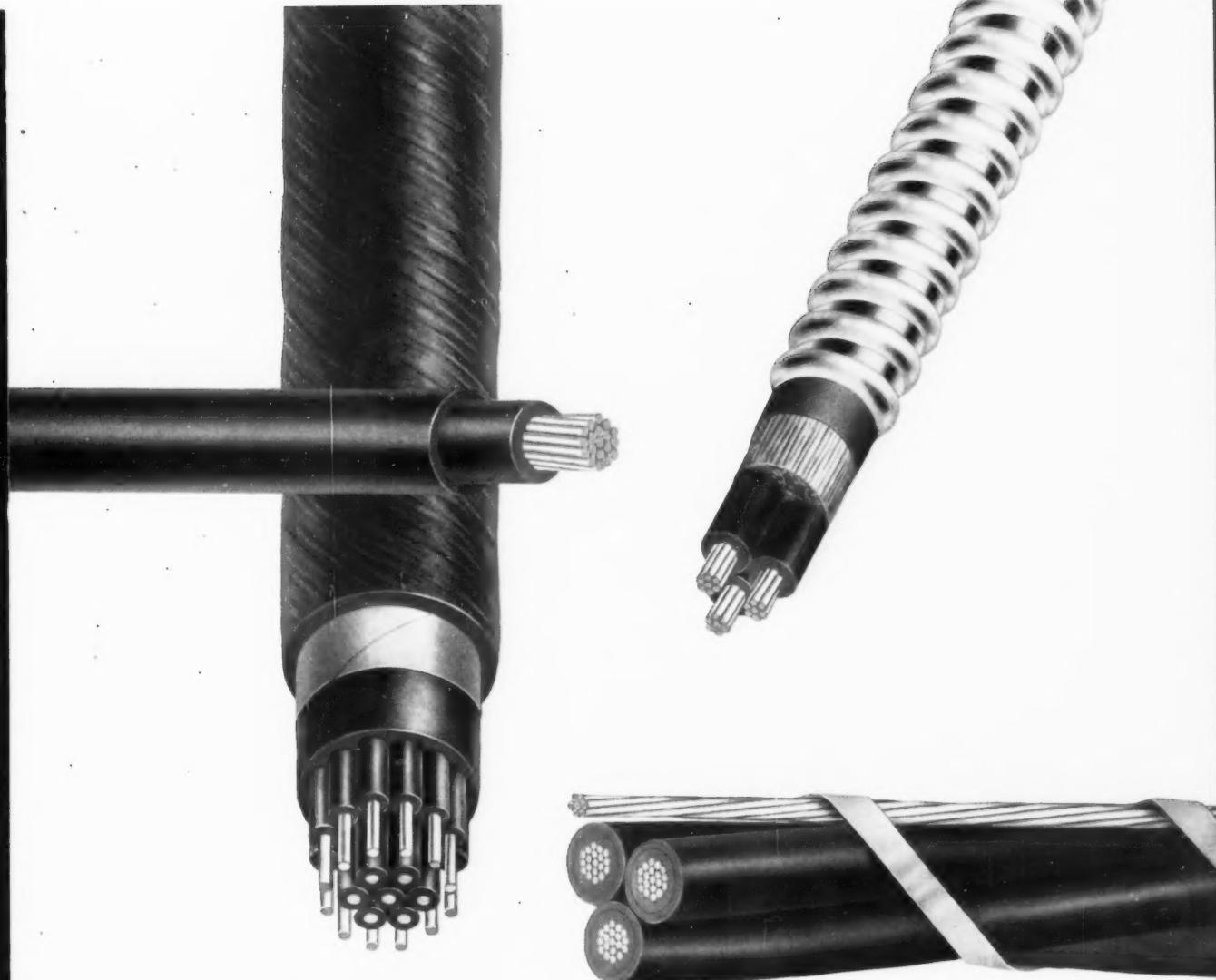
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sue was the liability of a municipality for injuries to a pedestrian who fell from a public walk into an adjacent unguarded pit.

The pit into which Winfred Vincent, aged 72, fell was 12 feet from a curved cinder path connecting a street sidewalk with the sidewalk on a bridge. It was in a direct line with the cinder path if one did not manipulate the curve in the path. The pit had been formed several years before

by the washing away of soil by the discharge from an 18-in. concrete pipe installed by the City to carry surface water from a ditch on the side of the cinder path. There was no barrier guarding the pit, no street light in the vicinity, and, on the night of the accident, the path was obscured by snow.

The City maintained that it had no duty to maintain barriers guarding the pit, as a pit twelve

feet distant from a public walk was not a part of the public street or of the highway.

The Court held that there is no specific distance away from a public street or highway beyond which the City's statutory liability stops. So long as the hazard is one that is intimately connected with travel along the public path, the City continues to be liable for its negligence.

#### Nuisances.

In *Jezowski v. City of Reno*, 286 Pac. (2d) 257, 52 A.L.R. (2d) 1127, a Nevada case decided Aug. 26, 1955, a neighboring property owner sought damages against the City of Reno for the nuisance caused by its operation of the City dump.

The City maintained its dump in a canyon some distance north of the city limits, and the plaintiff lived about a mile away. A caretaker was continually in charge of the dump, telling people exactly where to dump. A bulldozer pushed the material over the embankment into a lower section which was being filled. This then was compacted by the bulldozer and a dirt cover was placed over it. A different section in a deep ravine was used for bulky materials such as car bodies and trees. The softer materials were dumped where they could be covered as fast as possible. Fires starting spontaneously by the dumping of hot ashes were controlled by the dirt fill. Fencing and gates were installed, and roads were blocked to control private dumping.

The plaintiff claimed that the dump was a nuisance, that they choked on the smoke from the fires, that the smell was horrible, that one could hardly breathe. Nevertheless, the court held that the dump was not a nuisance, and so the City was not liable.

A survey of similar cases indicates that about half of them are held to be nuisances, for which the City is liable. There is no immunity in any event. ▲▲

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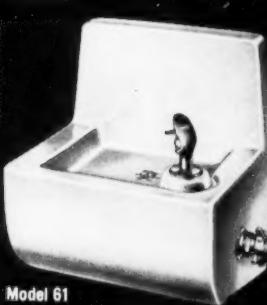


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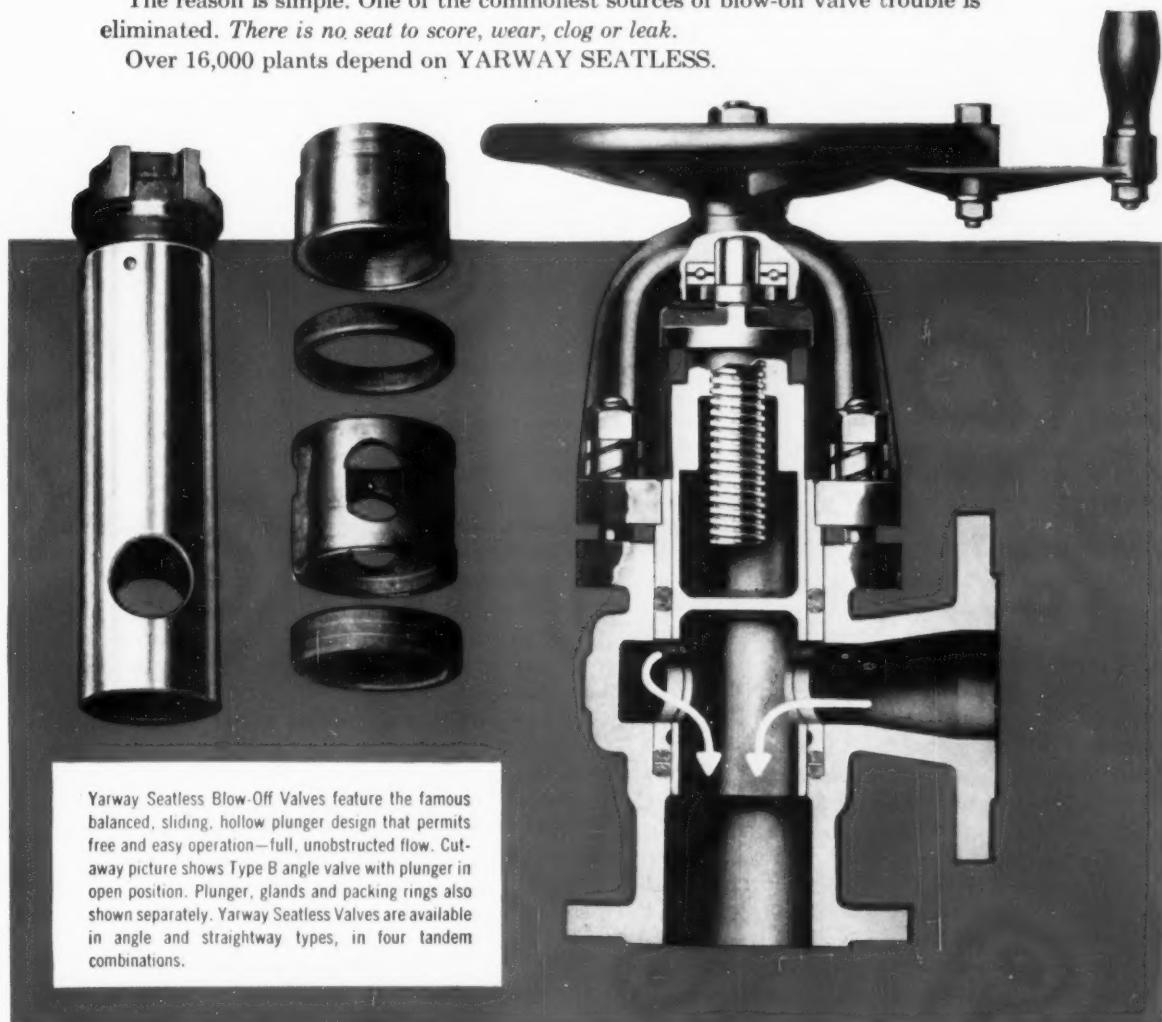
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BETWEEN. GRAPHITE ELECTRODE (AT RIGHT) WITH SHEET IRON CONTAINER, READY TO BE INSTALLED.



## Cathodes Can Protect Your Projects

W. P. MONROE, Sargent & Lundy

THERE MUST BE something in the make-up of some mechanical and civil engineers — those who lay out piping systems and other underground metal structures — that prevents their having faith in any electrical equipment that does not move like a motor. What other explanation could there be for their neglect, year after year, of cathodic protection? The large pipeline companies have made good use of cathodic protection for a long time, but they are an exception. Even some electric utilities, who should be more than willing to use a little current to protect their valuable equipment from corrosion, are almost as cautious about cathodic protection as they would be about a revival of alchemy.

As a result, there are factories, institutions, and power plants letting their underground pipes and buried steel structures rust away at uncontrolled rates except for an attempt at protective coating on the larger pipes. The management simply takes these losses without studying the savings offered by cathodic protection. Unfortunately, many consulting engineers do not seem to be offering their clients much assistance along these lines, unless they are specialists in the field.

### What is Corrosion?

Corrosion of underground structures, as every young engineer should know, involves the flow of

small electrical currents from the rusting metal to the surrounding soil. The lead sheaths on cables, for example, corrode when located near or connected to buried copper rods or pipe. Cathodic protection prevents corrosion of buried metals by reversing this flow. In effect, this transforms the base metals of the underground structure into the equivalent of noble metals, so far as the corrosion resisting properties are concerned.

The direct current needed to reverse the flow of electricity from an underground pipe, for example, usually is supplied by a rectifier. The buried metal structure becomes part of an electrical circuit which includes the rectifier and the electrodes buried or driven into the ground. Rectifiers can be selected that will supply as much or as little current as may be needed to protect the structure against corrosion.

### Galvanic Cell

Excessive current should be avoided. If the amount of current required is very small, a rectifier is not needed. The weak current can be provided by magnesium or zinc pigs used as anodes. These will form a galvanic cell in the soil and provide the required current without any exterior supply, as long as they last.

The electrodes for conducting current from a rectifier into the ground may be scrap steel rails, or if long life and higher current is desired, they may

be graphite cylinders or iron castings of special composition, backfilled with powdered coke to give good contact with the soil. These electrodes take the punishment instead of the structures they protect.

In choosing between scrap steel and the more expensive graphite cylinders, the cost of installation is paramount. Ordinary steel or iron corrodes at the rate of 20 pounds per year per ampere of current, while graphite corrodes at a theoretical rate of 2.2 pounds per year per ampere. This means that a graphite electrode, while carrying twice as much current, would last perhaps four times as long as a scrap steel rail used as an anode. The question to be resolved is purely an economic one — does the longer life and lower resistance of the graphite warrant its use when first costs and installation costs are considered? Generally speaking, when considerable drilling is required to fit the electrodes in the ground and installation costs are therefore high, it is better to use graphite cylinders back-filled with powdered coke and take advantage of the longer life. Where steel rails may be driven into the ground easily, it may turn out to be much less expensive to replace them at frequent intervals than to use more expensive graphite cylinders.

#### Pipeline Protection

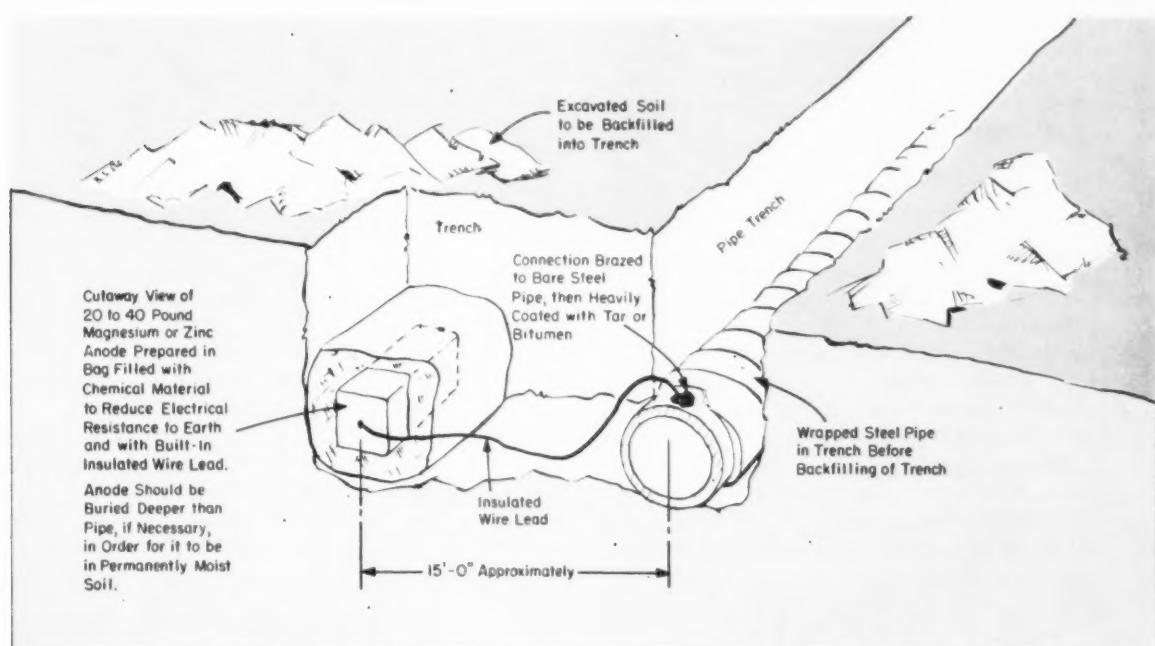
On underground pipelines, cathodic protection is seldom used alone. It is customary to wrap the pipes and coat them with bituminous or some other plastic coating to prevent corrosion. But there is always the possibility of pin holes or small voids in this covering, and cathodic protection should be used in ad-

dition. In fact, coated pipes without cathodic protection may become useless as rapidly as uncoated pipes, for the small bare spots will corrode at an accelerated rate, and a small hole through a pipe could be as bad as having the whole length rust through. It can be seen that the combination of wrapping and cathodic protection is ideal, for the wrapping reduces the amount of current required, while the cathodic system protects against voids in the coating.

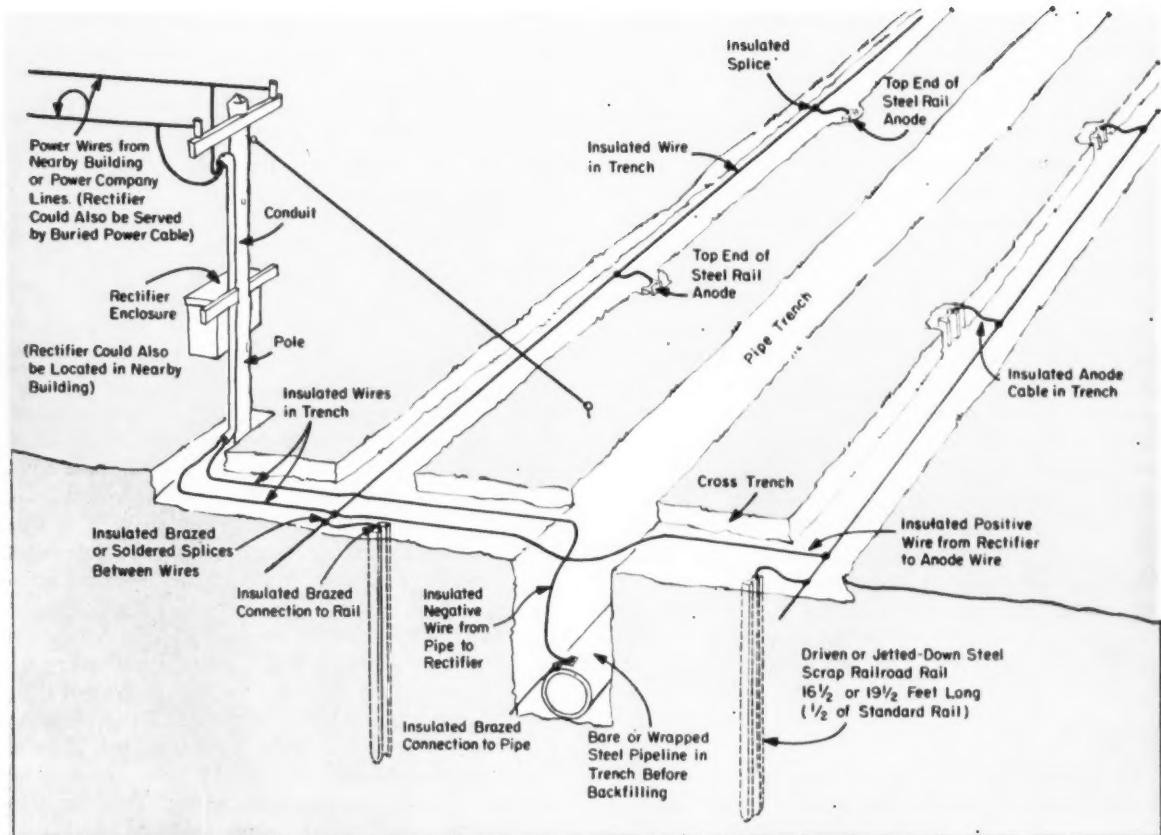
#### Current Requirements

The amount of current required to protect a buried metallic structure averages approximately 0.008 ampere per square foot of exposed area. This figure could vary considerably depending upon conditions. If the soil is fairly uniform, and other conditions are normal, less current could be used. In areas where there is a varying composition of the soils, this average current might have to be increased to insure that each part of the surface receives adequate current.

The size of the rectifier required depends upon the total current needed and the voltage necessary to cause a flow of current. In designing a system it is best to leave the maximum voltage of the rectifier unsettled until the first anodes are installed. Then a test is made to determine the voltage required to cause the desired anode current to flow from the anode to the pipe or other structure being protected. The rated voltage found to be necessary should be increased liberally to allow for drier conditions at certain seasons and for the gradual deterioration of



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the anodes. The rectifier specified should have means for adjusting the voltage as needed.

The current to be conducted to the earth by a carbon anode usually should be selected to result in an anode life of eight to ten years, depending on the cost of anode replacement.

#### Economic Considerations

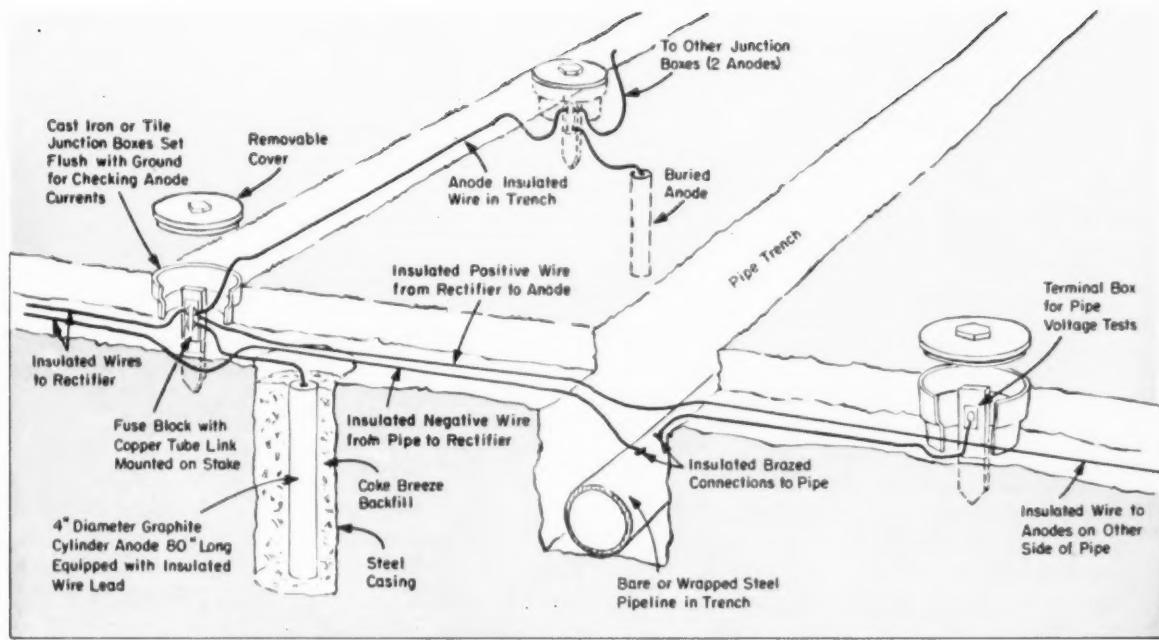
When a consulting engineer is studying the economic advantages of cathodic protection for a client, a cost estimate should be prepared. This would become the basis for an economic study comparing the protection cost with the cost of replacing the buried pipe or structure as frequently as required when unprotected.

Most of the investment for the installation of cathodic protection will be in the cost of excavation for anodes and trenching for the connecting wires. It is also wise to provide for testing by the installation of terminal boxes to permit the measurement of anode currents and the measurement of voltages to earth with a high resistance volt meter, and the cost of this should be included in the economic study. Once the economics of the system are clear, the engineer will have no problem in deciding whether cathodic protection is worthwhile.

#### Location of Anodes

Locations of the anodes with respect to the buried structure should be given special study. They should not be less than 15 or 20 feet from the structure, for too close a location would prevent uniform current distribution. If they must be close to the structure because of property lines or other considerations, then anodes should be symmetrically spaced on both sides of the metal being protected. If there are other structures in the way, the anodes can be located at a distance, preferably as far away as the length of the protected equipment. The anodes themselves should be at least 10 or 15 feet from each other. Efficiency of the system can be increased by locating the remote anodes in permanently moist ground such as might be found near a pond or stream.

It is important to remember that neighboring underground metal structures not tied into the protection system can be adversely affected by stray currents from the anodes. For example, if underground telephone cables were located close by a pipeline protected by a cathodic system, stray currents from the anodes might accelerate corrosion of the telephone cables. The owner of the cables might not look favorably upon this. The solution is to tie the neighboring structure into the system so that

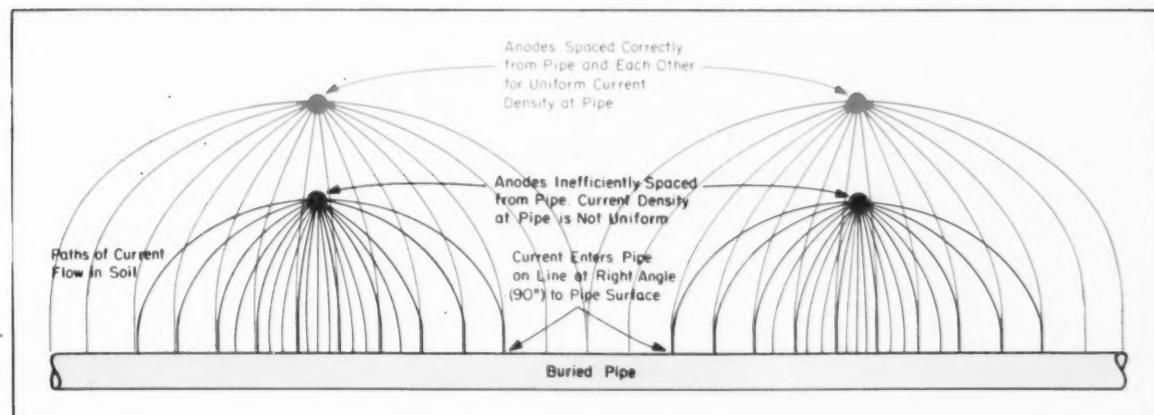


CATHODIC PROTECTION SYSTEM USING LONG-LIFE GRAPHITE ANODES. JUNCTION BOXES PERMIT PERIODIC TESTING.

it, too, is protected rather than harmed, with the permission of the owner, of course.

Some railroads have signals operated by d-c track circuits, though some main line railroads now have changed to a-c signal systems. It is important wherever a cathodic protection system is to be installed near a railroad that this be checked. Stray d-c current could affect the signal circuits. There is no simple solution to this problem, and about the only thing that can be done is to get together with the signal department of the railroad for tests and for protective measures if these are found to be necessary. It might be possible to reposition some of the electrodes so that they do not affect the signal system, yet still protect the pipeline.

The design of a cathodic protection system is not particularly difficult. If you, as a consulting engineer, have had no experience along this line, it may be well to call in a corrosion engineer on a major project, but any good electrical engineer should be able to handle the design of a simple system. There are a number of short courses in corrosion offered by engineering colleges, and an engineer who had taken one of these certainly should be qualified to handle almost any project. Experience, of course, is important, and this can only be had in actually designing, constructing, and testing a system. There is nothing mysterious about simple cathodic protection, and more consultants should see that their clients get the savings it makes possible. □



EFFECT OF ANODE SPACING FROM PIPE. CLOSE SPACING CAUSES NONUNIFORM CURRENT DENSITY AT PIPE SURFACE.

**THE PRIVATE PRACTICE** of engineering takes many forms, but in this century the consulting engineer has practiced primarily as a part of the construction industry. The average consulting engineer designs and supervises the construction of structures ranging from bridges to sewer lines; from huge power plants to small schools — working in all fields of engineering. Only a few practice within a narrower meaning of their title where "consulting" connotes advising clients.

John B. Harju, P. E., of John B. Harju and Associates, Ferndale, Michigan, is a consultant in the strict sense for he deals primarily in industrial plant layout and the improvement of manufacturing methods as they apply to the planning of new plants and operations, or to the relocation, consolidation, or decentralization of existing facilities.

Production planning is an engineering service that more consulting engineers might profitably offer to their clients. Too many engineers feel that their job is done when they have completed supervision of construction of the structural shell of the building which will contain the production equipment. They leave the equipment layout and the process planning to the client's employee engineers. Frequently these men are too close to the process, too restricted by their past practices and experiences, to get the most out of a new plant. A fresh approach often is needed, and the best results can be obtained by planning the production equipment layout as the initial step. Only then can the building and the utility services be designed to meet the specific process requirements.

It is in this field that Harju practices. His approach to client problems and method of presenting solutions should suggest new client services to other consulting engineers.

# Industrial Production Planning . . .

## Another Service of Consulting Engineers

**STAFF REPORT**

### 1. Idea Sessions

The consulting engineer starting out on a project involving plant layout and process improvement will find that foremen, overseers, and supervisors are important sources of information. These employees are intimately familiar with their work and many of them have excellent ideas that they have kept to themselves for various reasons. Later, after basic decisions have been made involving changes in equipment and layout, conferences are held with these employees to get their reaction.



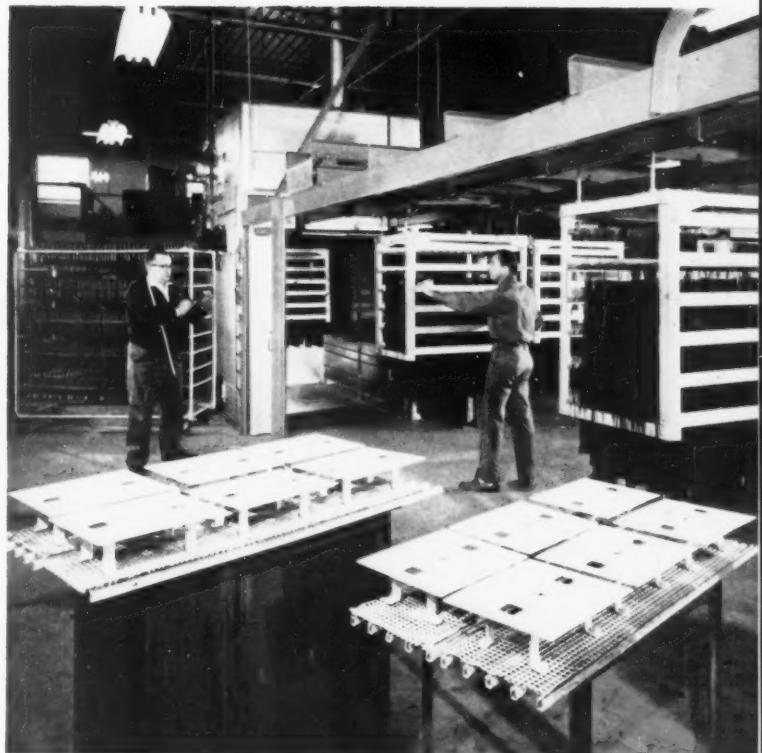


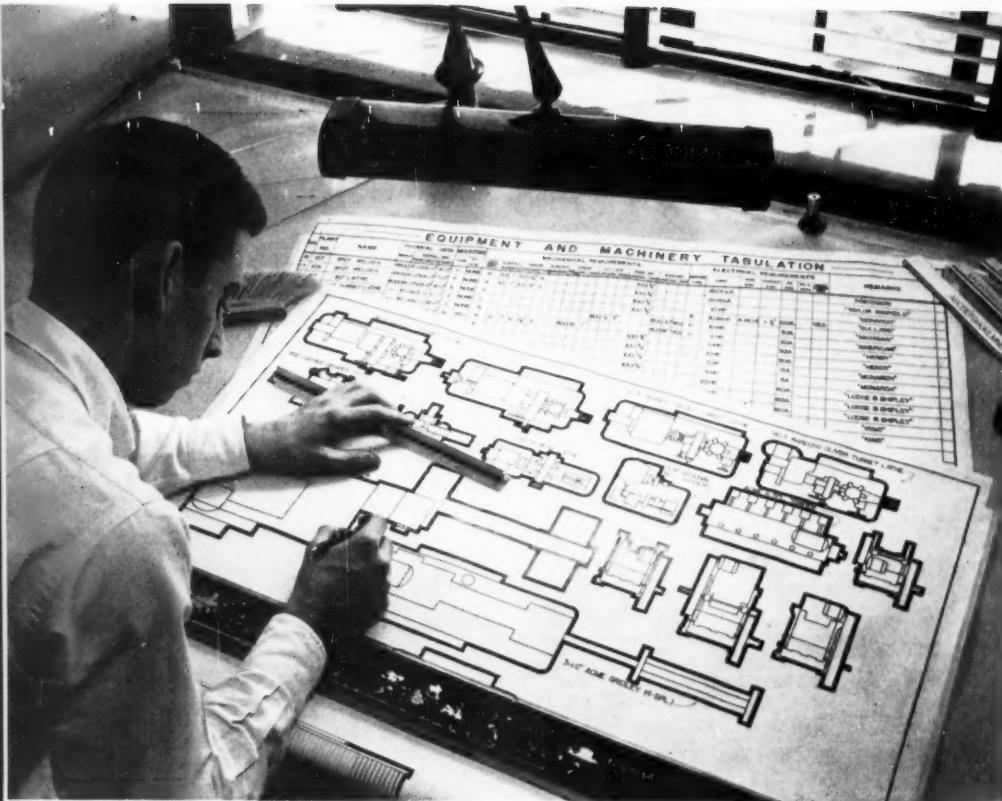
## 2. Measuring Equipment

A plant layout project requires the collection of preliminary data. Physical dimensions of each piece of equipment must be made and all utility demands must be established. This study also should show the type of mounting, foundation, and exhaust system needed. Not only is information recorded for the basic items of equipment, but a study is made of the materials handling system best suited between each process stage.

## 3. Operations Analysis

The engineer must study methods currently being used. At this stage he decides which operations can best use automatic materials handling or which might be best adapted to semi-automatic systems. The problem of materials handling — selecting the right equipment for the particular duty — is an important part of the consulting engineer's job. It is in this phase of the work that many opportunities to accomplish savings in production costs present themselves.





#### 4. Templates and Equipment Data

Once data have been recorded and the system studies made, the work goes back to the engineer's office. The dimensional data is translated into templates. Here  $\frac{1}{4}$ -in. scale templates are being inked, and simultaneously the utility requirements are tabulated. This information is used later in the preparation of specifications for obtaining bids from manufacturers on any new equipment needed and bids from contractors for moving and installing machinery and for relocating the utility services.



#### 5. Layout Materials

Now it is time to position the templates on a scaled plan of the plant. Harju has found that scaled rigid aluminum sheets are best for plants with 50,000-sq ft floor area or over. Smaller plants can be handled on flexible plastic layout sheets. Double-backed tape is used to hold templates in place, and black adhesive tape is used to show walls or divisions between departments. There are a number of other preprinted tapes that serve as useful timesavers.

## 6. Engineering Associates

Major projects may call for extensive changes in utilities and even for new buildings or additions. This means that the industrial consulting engineer must work with electrical, mechanical, chemical, metallurgical, civil, and structural engineers. All of these must work together, each fitting his designs into the whole. Here three independent consulting engineers (Fred Layne, mechanical; Herbert Snellings, structural; and Albert Migdal, electrical) coordinate their aspects of an industrial waste disposal job with Harju's over-all layout and process flow diagram.



## 7. Preparation of Client Report

It is important that the client receive a clear presentation of the final engineering decisions. This is done by combining a written report with reproductions of the plant layout. Ozalid reproductions can be made from the original transparent plastic sheet layouts, whereas reproductions of aluminum grid boards necessitate special methods.

## 8. Presentation to the Client

The final report and copies of all layouts must be presented to the client and all of his questions answered. When the client is satisfied and the recommendations are accepted, complete engineering drawings are made, and specifications are prepared so that competitive bids can be procured from the various contracting trades for the work entailed on the particular project. Harju oversees the over-all project with each associated engineer supervising the work having to do with his particular design.





# Plans and Projects to Promote the Profession

*A Staff Report Based on a Survey of the Profession*

LAST MONTH AN ARTICLE "How Well Are You Recognized?" was published in this magazine. It was the first part of a staff report based on a Survey of the Profession. Briefly, this report showed that in the opinions of consulting engineers:

- ¶ The general public understands the functions of the consulting engineer somewhere between "Poorly" and "Not at All."
- ¶ The private client group understands the consulting engineer's functions somewhat less than "Fairly Well."
- ¶ The public client group is only slightly better informed than the private client group.
- ¶ Architects understand the functions of the consulting engineer better than other client groups, but still not as well as they could.

In addition to these conclusions, the Survey showed that consulting engineers felt little was being done either by their own individual firms or engineering organizations to educate the general public or these special client groups.

The first half of the Report showed the existing situation — as consulting engineers see it. This last half of the report has to do with what individual consulting firms and the various associations and societies are now doing and plan to do to educate the general public and the special client groups.

## Lack of Understanding

A study of the comments made on the Survey questionnaires clearly shows that consulting engineers are disturbed by the lack of understanding of their profession. They feel that the education of potential clients as to the consulting engineer and his work is of major importance. Engineers in private practice are convinced that they can save money for industrial firms and can do a better job of design, specification, and supervision of construction than can the firms' own employee engineers or engineers employed by equipment manufacturers.

Consulting engineers also are certain that they can save public funds on highways, waterworks,

sewage disposal plants, and all other public works if they can convince public officials that engineering should be on a fee basis rather than through civil service employees.

And while the majority of good architects currently make considerable use of the services of consulting engineers, there are still some who mistakenly feel that they can get their engineering done cheaper through employee engineers or "free" engineering from manufacturers than they can through independent engineering firms.

Consulting engineers themselves know these facts, but conditions will not change until potential clients currently getting their engineering from employee engineers also know.

Here we have an enormous problem in publicity and education.

What is being done about it and what is planned?

## Advertising and Publicity

First, what are firms of consulting engineers doing individually to educate the potential client groups? There are two possible approaches: advertising and publicity. Advertising means telling one's story through the purchase of advertising space, or time, or by the direct mailing of brochures or sales literature. Publicity, on the other hand, is not paid for in such a direct fashion. It covers news stories or editorial features in magazines or newspapers, presenting papers before societies, and other such activities.

Advertising in newspapers and magazines can be either display advertising or a simple, professional card. Generally speaking, engineers avoid display advertising as bordering on the unethical. Still, there are some good engineers who do not see it that way. Go through any copy of *Fortune* magazine and you will find display advertising by not only a great many large engineer-contractors but also by a few independent consulting engineers as well.

The Survey showed that for the United States as a whole, 11 percent of the respondents placed display advertising in business and professional magazines. However, almost all of these are engineer-

### TYPES OF PUBLICITY ACTIVITY IN WHICH CONSULTING ENGINEERING FIRMS ENGAGE

|            | <b>Magazine<br/>Articles<br/>%</b> | <b>Stories for<br/>Newspapers<br/>%</b> | <b>Direct Mail<br/>Publicity Pieces<br/>%</b> | <b>Papers and<br/>Speeches<br/>%</b> | <b>Other<br/>%</b> |
|------------|------------------------------------|-----------------------------------------|-----------------------------------------------|--------------------------------------|--------------------|
| South      | 39                                 | 21                                      | 6                                             | 48                                   | 6                  |
| Midwest    | 45                                 | 27                                      | 12                                            | 44                                   | 7                  |
| Southwest  | 43                                 | 29                                      | 6                                             | 50                                   | 6                  |
| East       | 49                                 | 19                                      | 13                                            | 52                                   | 6                  |
| West       | 43                                 | 27                                      | 12                                            | 52                                   | 5                  |
| U.S. Total | 45                                 | 23                                      | 11                                            | 49                                   | 6                  |

constructors rather than independent consulting engineers. In fact, there are probably not 10 independent consulting engineers in this country who carry magazine display advertising regularly—and these are all very large firms doing engineering on a national or international basis—firms like Charles T. Main, Lockwood Greene, Robert & Co., and J. E. Sirrine.

#### Professional Cards

Professional cards are quite a different matter. Almost half (47 percent) of the consulting engineers place professional cards in magazines. While many of these are nothing more than courtesy advertisements given to support local engineering society publications, some consulting engineers do purchase this type of advertising in large national magazines.

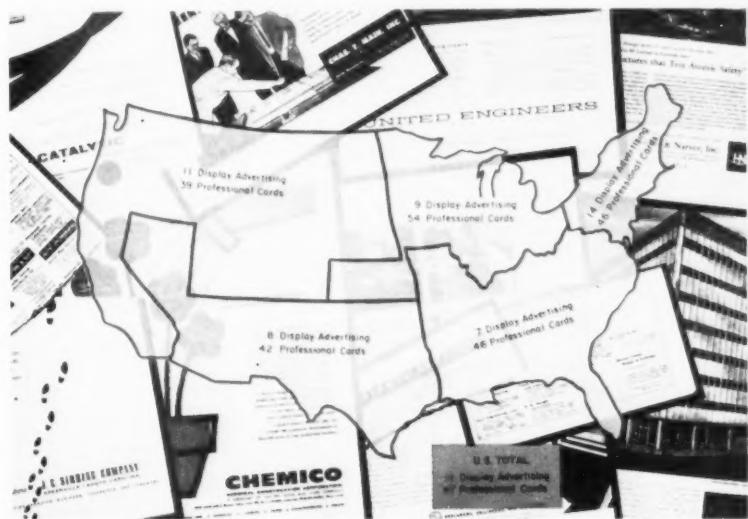
Consulting engineers do much less advertising in newspapers than they do in business and professional magazines. Only 4 percent (again mostly engineer-contractors) purchase display advertising in newspapers, and only 8 percent place professional cards.

The vast majority of engineering firms advertise in another way. They print illustrated brochures or professional records which are mailed out or given personally to prospective clients. A big 71 percent say that they do this type of advertising. About 39 percent distribute illustrated, and quite elaborate, brochures. And 32 percent simply make their printed professional record available to potential clients.

#### Types of Brochures

It is reasonable to assume that the simpler brochures and records are prepared in the engineer's own office, while the more elaborate pieces are prepared by outside firms such as advertising agencies or publicity organizations. The survey shows that of those engineers who do send out direct mail material of this type, 22 percent make use of these outside organizations for the production and printing of brochures while 78 percent handle this work within their own office. We can say with reasonable certainty, then, that about a fifth of these mailing

THE FIGURES IN EACH SECTION OF THE COUNTRY SHOW THE PERCENTAGE OF CONSULTING ENGINEERS WHO PLACE DISPLAY ADVERTISING OR PROFESSIONAL CARDS IN BUSINESS AND PROFESSIONAL PUBLICATIONS.



THE FIGURES HERE INDICATE THE PERCENTAGE OF CONSULTING ENGINEER FIRMS THAT ENGAGE IN DISPLAY ADVERTISING OR USE PROFESSIONAL CARDS IN THE NEWSPAPERS.



pieces are fairly elaborate, put together by experts and openly intended to be promotional literature.

Despite the extensive use of professional card advertising and direct mail promotion pieces, the opinion is still expressed by most consultants that "advertising is not ethical." Apparently, this only refers to display advertising in publications.

Unfortunately, professional cards are of no value in educating the several client groups. Executives of an industrial firm or public officials who do not know what a consulting engineer is could hardly be expected to learn much by looking at a page of professional cards. Promotional brochures, on the other hand, can be educational pieces. A well written publication of this type can give considerable information concerning the consultant's work.

The simple professional record, like the professional card advertisement, is of practically no educational value. It is useful only to the potential client who already understands the function of the consulting engineer.

#### Brochure Production a Problem

If, then, we eliminate display advertising as unpalatable to most independent consulting engineers, and if we dispose of professional cards and professional records as educationally worthless, this leaves only the firm brochure as an effective educational piece. And it will be noted that of the 39 percent of the firms that publish this type of literature, only half use outside experts for their preparation and production.

It is possible to produce a dignified brochure that clearly explains what the consulting engineer does and how he can save his client money without overstepping the bounds of good taste. There need be nothing vulgarly self-laudatory about a publication of this type, and it can certainly serve to further

an understanding of the functions of all consulting engineers. A number of excellent brochures, fitting this description, have been published by consulting engineers in the past few years.

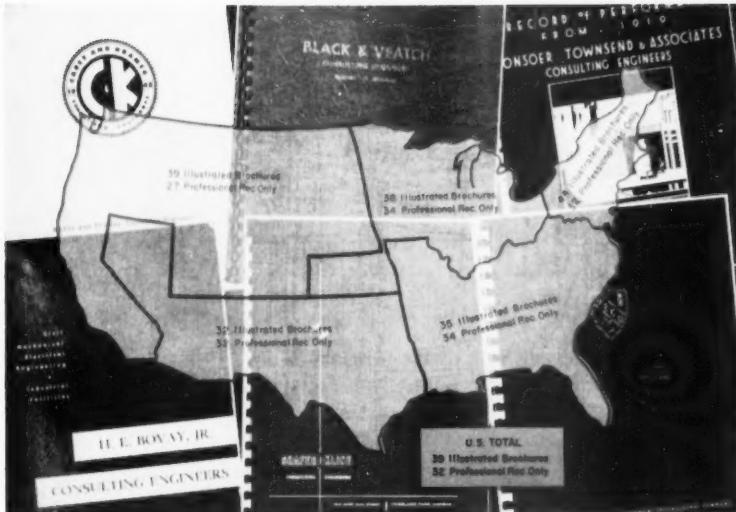
But it is not easy to find an agency qualified to produce a good brochure. As a comment on one of the survey questionnaires pointed out, "the only groups that know less about consulting engineers than the general public are the advertising and public relations people." There is much truth in this. It is strange that an advertising agency, set up very much like a consulting engineer firm, as a service agency, cannot understand how consulting engineers work. They are constantly confusing them with contractors or industrial management counselors.

Many consulting engineers who have gone to advertising firms to have brochures prepared found that they had to spend weeks in conferences trying to explain to advertising executives what the brochure should say. There are exceptions, and the consulting engineer who wants a good brochure should investigate advertising agencies carefully and find one that has had experience in dealing with professional people.

It is not necessary for promotional booklets to be elaborate or expensive. There is a tendency to give expensive publications only a limited mailing. Less expensive booklets can be in equally as good taste, as educational, and can be given wide distribution.

#### Ethical Aspects

While not specifically mentioned in the Canon of Ethics, it is obvious that publicity activities as well as advertising can be unethically self-laudatory. A firm of consulting engineers that hires a public relations organization to pump out publicity releases for the press could be as guilty of self-laudatory activity as a firm that openly purchases



THESE FIGURES INDICATE THE PERCENTAGE OF FIRMS THAT HAVE PREPARED PROMOTIONAL BOOKLETS OR PROFESSIONAL RECORDS FOR DISTRIBUTION TO CLIENTS OR PROSPECTS.

display space. A personal publicity program, handled loudly and vulgarly, is obviously unethical.

On the other hand, there are forms of publicity that not only are acceptable but highly respected. The engineer presenting a paper before one of the Founder Society meetings is not only disseminating technical information; but he is also engaged in publicity work for his firm. And the consulting engineer who writes an article for publication in one of the industrial, power, or municipal magazines is certainly cognizant of the publicity value for him and his firm. This kind of publicity is generally accepted as ethical.

#### Article Writing Popular

Backing this up, the Survey showed that 45 percent of the respondents have written articles for magazines, and 49 percent either regularly or occasionally present papers before societies. About half that number (23 percent) work with newspapers on publicity stories, while 11 percent send out direct mail publicity releases of various types.

These figures would indicate rather extensive publicity programs by engineering firms. However, much of it is misdirected. An examination of articles authored by consulting engineers and published in trade magazines will show that very few authors make any effort to tell the readers about the functions of the consulting engineer. For example, most of these articles written by consulting engineers give all the details concerning the project but say little or nothing about the contribution of the consultant. The reader learns about the design but not about the designer or his firm's functions.

This is simply one example of the way consulting engineers fail to take full advantage of the publicity opportunities offered them. It would be to the benefit of the profession, if in writing articles of this

type, the author clearly pointed out the advantages to the client that resulted from his use of a firm of engineers for design, specification, and construction supervision.

Consulting engineers make relatively little use of outside organizations for direction of their publicity programs. About 88 percent of the consulting engineer firms handle their own—if any. Only 12 percent work with an outside organization.

In fact, in the U.S. as a whole, three-quarters (76 percent) of the consulting engineer firms do not have any employees assigned to publicity or public relations work. About 16 percent have an employee assigned to this type of work part-time, while 8 percent have full-time employees. Of this 8 percent, half have one full-time publicity employee, while the other half have two or more.

Of the 12 percent who have used outside organizations to handle their publicity, only 7 percent use them regularly. Three-quarters of the consulting engineers have never used an outside publicity organization at any time.

#### Trend is Toward More Publicity

The results of the next Survey question showed that 44 percent of those answering felt that individual firms of consulting engineers should engage in more public relations and publicity activity. Only 7 percent said that engineers should avoid all publicity and public relations activity. Since this is a project engineering firms are free to undertake on their own, it is logical to expect some increase in firm sponsored public relations and publicity activity. If this increased activity is handled with good taste and good sense, there is no doubt but that it will work to the benefit of the whole profession. Certainly, individual firms of consulting engineers should make more of an effort to see to it that their

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Likely to be  
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Magnetrol is so simple that failure is all but impossible! Using only permanent, unfailing magnetic force for its operation, there's nothing to wear out . . . no diaphragms or bellows to stiffen and rupture . . . no electrodes to short or corrode . . . no packing to bind or leak. Magnetrol is practically maintenance-free! Magnetrol units are available for controlling level changes from .0025-in. to 150-ft. . . . with multi-stage switching when desired. Send coupon for full details.

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own firm brochures do a better job of educating the potential client than is being done now.

While slightly less than half of the answers indicated that individual public relations efforts should be increased, a heavy majority (73 percent) felt that it is primarily the engineer associations and societies that should engage in more public relations and publicity activity in behalf of engineers in private practice. This seems to make good sense. Whatever criticism might be leveled at advertising or publicity activities of individual firms, associations and societies are ethically free to promote their professional groups. Here there is no question of self-laudatory pronouncement. And consulting engineers overwhelmingly favor association advertising and publicity. Wanting the various societies and associations to undertake this promotional activity is not a matter of passing the buck. Most consulting engineers feel that education of the public is primarily a group responsibility.

#### Founder Societies' Viewpoint

On the other hand, the Founder Societies and most of the other technical associations do not look upon publicity and public relations work for the consulting engineer as being their particular problem. Engineers in private practice are but a small minority of their total membership, and while they are interested in the welfare of all their members, they cannot properly assign any sizeable amount of money to the promotion of one special segment of their membership over another.

For example, if one of the societies were to undertake a program of promotion for the consulting engineers interested in getting highway work, this might be stepping on the toes of society members who are employees of state highway departments.

For these reasons the Founder Societies and other technical associations feel, quite properly, that their publicity and public relations programs should be aimed at better public understanding of all engineers rather than just engineers in private practice. The American Institute of Electrical Engineers, for example, takes the position that it is a technical society and is set up to serve electrical engineers both in and out of private practice. They have no separate service for consulting engineers or any other special group. The Institute should be congratulated for its clear cut understanding of the proper function of a technical society.

The American Society of Mechanical Engineers has a Committee on Professional Practice of Consulting Engineering, a Committee that until recently was under the Board of Technology but now reports directly to the Council. During the past year a sub-committee of this group published a manual of consulting practice for mechanical engineers. This manual, however, is of interest and value only to consulting engineers and therefore could not be

classified as publicity or promotion material for any client group. This sub-committee also published a directory of mechanical consulting engineer members of the Society. This directory has been widely distributed, but neither is it really an educational or promotion piece.

Engineers Joint Council, as a federation of technical societies made up of engineers in all branches of the profession, is naturally more interested in educating the public concerning engineers in general than consulting engineers in particular. EJC has done an excellent piece of work for the consulting engineer in the recent publication of a good manual of practice, but again, as important a project as this is, manuals of practice are not publicity directed at the client groups.

#### NSPE Activities

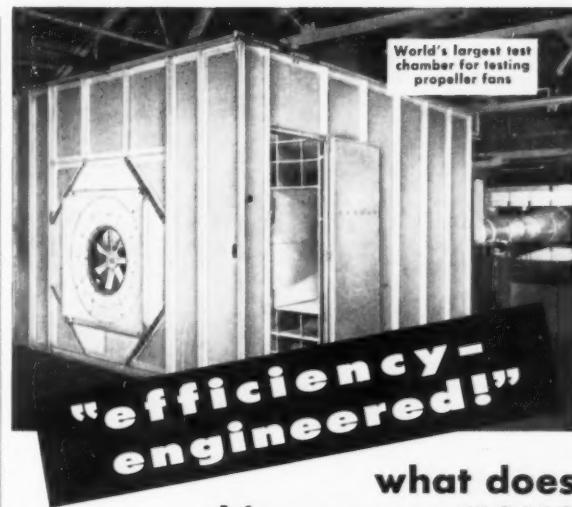
The National Society of Professional Engineers is avidly interested in its consulting engineer members, as are many of its State Societies. On a national level, most of the educational and publicity activity for the engineer in private practice has been in connection with national legislative work. NSPE has done a fine job of telling congressmen and administrative government employees about the consulting engineer and his reasons for existence. Some of the State Societies also have done a good job.

It must be concluded, however, that while the technical societies and the professional societies are engaged in many worthwhile and even essential programs for the consulting engineer, none of them has any specific publicity program directly aimed at telling the public or the special client groups what the consulting engineer is and what he can do. There is no reason why they should. Neither the technical nor the professional societies were organized to act as trade associations or chambers of commerce for the special interests of the engineer in private practice.

#### CEC Responsibility

The Consulting Engineers Council is the group that should be doing the most to explain to potential clients the function of the consulting engineer. The Consulting Engineers Council represents only engineers in private practice, and being basically a business rather than a technical or professional association, it has every reason to devote its monies and its energies to the promotion of its branch of the profession.

The Council, at their last board of directors meeting, allocated about \$6000 to the production of a brochure explaining what the consulting engineer is and what he does. This is scheduled for publication in the spring. The Council intends to distribute it widely to both public and private client groups. If the brochure is well done and properly distributed, this can be a major publicity accomplishment.

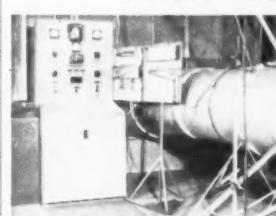


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It is being handled under the direction of Ralph Westcott, immediate past president of the California Association of Consulting Engineers.

The board of directors of the Council is fully aware of the need for much more than publication and distribution of one brochure. However, they are handicapped by both time and money. The Council has a very limited budget. Members of the executive committee say that they intend to spend every available dollar in the years ahead for promotion of the private practice of engineering.

#### Efforts of the Member Groups

There are 19 autonomous associations federated in the Consulting Engineers Council. Several of these state or regional associations have their own publicity programs. The Oklahoma Association, for example, has been sending members to speak before public and semi-public groups such as school boards, park commissions, and industrial development commissions to explain the consultant's role and tell how his services can be used to advantage.

The Intermountain Institute of Consulting Engineers (Utah) has a publicity committee that sees to it that newspapers and local publications get information on the activities of consulting engineers. Members of the Intermountain Institute are also serving with the State Superintendent of Public Construction on a committee studying school construction. They have also worked with the State Highway Department in the preparation of standard contracts for consulting engineer services. The Institute has been meeting jointly with the local AIA and the Utah Engineering Council to try to inform the architect group and the private client group (through their management group engineers) concerning the proper architect-engineer or client-engineer relationship.

The experiences of the Dallas-Fort Worth Chapter of the Texas Association of Consulting Engineers show good intentions but poor results. The group spent \$3500 in less than eight months in the employment of a public relations counselor. There was much discussion of the publication of a brochure, improvement of relations with the press, specific project publicity with proper identification of engineers, and news releases to local and national magazines and papers. The end result, however, was confusion, and no workable program was forthcoming. This illustrates the dangers of attempting to handle public relations and publicity through an outside organization that does not fully understand professional problems or private practice.

Three state associations have published and distributed brochures explaining the consulting engineer. California published an excellent brochure of this type about a year ago, the Illinois Association came out with one the end of last year, and the Oregon Association just received theirs from the

printer. The Consulting Engineer Association of New Mexico has a brochure of this type planned as do the Iowa Association, the Gulf Institute and the Minnesota Association of Consulting Engineers.

The New York State Association of Consulting Engineers has three chapters, Central New York, Rochester, and Western New York. Each of these chapters is now preparing a brochure that will be sent to state officials, architects, contractors, and builders' organizations. Plans are also being made for a brochure for the state organization as a whole. This would be given national distribution. Oregon is also publishing a special brochure aimed at public officials.

The Consulting Engineers Association of California has a committee working with the American Institute of Architects in what is known as the Architects and Engineers Conference Committee of California. This group is doing a great deal to bring about better understanding between the two groups and thereby increase the amount of work turned over to consulting engineers by architects. A similar program has succeeded in Oregon.

The policy committee of the California Association now has taken the position that publicity and public relations activities should be held up until an appraisal can be made of the work being done by Consulting Engineers Council. Then, the state association will fill any gaps.

The Missouri Association of Consulting Engineers says that most of their publicity and educational efforts have been in dealings with the public client group. Several committees of the Missouri Association have met with state officials—and municipal bodies have been told about the functions of the consulting engineer. Efforts are also being made to form a joint committee with AGC and AIA so that architects and contractors can understand the advantages to be gained through the full use of consulting engineers' services.

#### Progress is Slow

While it is clear that the state and regional associations and the Consulting Engineers Council are fairly conscious of the need for publicity and promotion, and while some excellent projects are planned, the fact is that except for brochures published by three state associations, not very much has been done yet.

An effective educational program is not easy. Most engineers are not able, alone, to carry out any really effective program. They are notorious for their poor understanding of public relations and publicity procedures. And this is not a job for amateurs. On the other hand, if consulting engineers do not understand the intricacies of publicity, public relations firms and advertising agencies seem to be even less informed about the private practice of engineering.



**G. E. SONDERMAN**  
Singmaster & Breyer

G. E. Sonderman is a partner of Singmaster & Breyer, Engineers, and vice president of S & B, Inc. He presently is heading up their sea water conversion projects, including the major installation for the Island of Aruba.

He has handled a number of foreign projects in such widely separated countries as India and Iceland, the government of Iceland awarding him the Order of the Falcon. He joined S & B during the last war, handling defense plants for metallic magnesium and participating in the original Manhattan District project. Prior to 1942 he spent 17 years in steam power plant work for leading utilities, including an American Gas and Electric 2500 psi installation. He holds a degree of B.S. in Civil Engineering from Clarkson College of Technology, and he is now a Trustee. He is a member of the ASME and a licensed P.E. in New York, Connecticut, California, and Florida.



## Today's Price for Fresh Water from the Sea

FRESH WATER TAKEN from the salty sea has long been an accomplished fact. The populations of two Caribbean islands, Curacao and Aruba, are almost totally dependent upon converted sea water—and have been for 20 years. Right now, sea water conversion plants in operation or under construction throughout the world have a combined capacity of more than 12-million gallons each day. This is an impressive statistic when you consider that 10 years ago the total installed capacity was less than 2-million gallons per day—and this figure represented principally the Curacao and Aruba plants.

These proven successes have stimulated an increasing world-wide interest in the manufacture of fresh water from the sea. Nor is interest confined to the world's extensive arid regions, whose future hope of growth is closely tied to the search for fresh water. Coastal areas find that their natural water supplies are being exhausted as demand soars with growth of population. They must go to the sea or be faced with mounting costs in reaching farther and farther inland to tap new sources.

The big question, therefore, is one of cost. While the cost of natural fresh water is rising constantly,

the cost of converting sea water is coming down. While there is still a gap between the two for any area that can find fresh water at reasonable distance, this gap is closing, and salt water conversion plants are approaching the point of economic justification. The chart on page 98 illustrates this economic relation today, and it does not require much extension of the curves to bridge the gap. Salt water conversion plants can produce fresh water for total costs of \$1.00 per thousand gallons or even less under favorable conditions.

### Costs Must be Viewed Realistically

A cost of \$1.00 may come as a disappointment to readers who have had intimation of water being had for 65¢, or 40¢, or even 20¢ per 1000 gallons. Certainly it falls far short of the 32¢ per 1000 gallons goal set by the U.S. Department of Interior's research group for conversion of saline water to domestic water. Nevertheless, it is a true figure for the only processes that have proved practical for large installations.

One fundamental tenet of conversion costs remains unchanged in the face of all developments. Large scale conversion cannot, in the foreseeable



THE OLD SEA WATER CONVERSION PLANT AT ARUBA. NEW PLANT IS BEING BUILT IN RIGHT FOREGROUND.

future, compete with the transport of fresh water over reasonable distances by aqueduct or pipeline from natural sources. Every existing or proposed major installation was born of a situation where no adequate source of fresh water is readily obtainable.

#### History of Sea Water Conversion

Man has been trying for a long time to change salt water into fresh. Francis Bacon (1561-1626) discussed this in the first chapter of his book *Sylva Sylvorum*, a compilation of notes on his scientific meditations and experiments, published in 1625, nine years after his death. He says,

"Dig a pit upon the sea shore, somewhat above the high water mark, and make it as deep as the low water mark; and as the tide cometh in, it will fill with water, fresh and potable. This is commonly practiced upon the Coast of Barbary, where other fresh water is wanting. And Cesar knew this well, when he was besieged in Alexandria; for by digging of pits in the sea shore, he did frustrate the laborious works of the enemies, which had turned the sea water upon the wells of Alexandria; and so saved his army, being then in desparation. But Cesar mistook the cause, for he thought that all sea sands had natural springs of fresh water. But it is plain, that it is the sea water; because the pit filleth according to the measure of the tide. And the sea water passing or straining through the sands, loseth the saltiness."

Actually, it would seem that Caesar, 16 centuries earlier, made the closer guess, but Bacon had a more scientific mind, for he goes on to discuss experiments on filtration of salt water, and he points out the need for further careful investigation. It is clear, however, that Bacon had no concept of the

true nature of a solution, for he was sure that some type of filtration would make the sea water fresh.

The distillation of sea water to obtain fresh water is a technique almost as old as the teakettle. The first practical, sizeable installations came with the advent of the steamship and its requirement of fresh water for boilers. Distillation aboard ship eliminated the need for carrying fresh water between ports, and it increased payload space. Today every large ship has its battery of evaporators.

Despite the maritime industry's long history of satisfactory operation, the first large, land-based plants — those at Curacao and Aruba — were not built until 20 years ago. On these islands there is a very limited rainfall during but a few months each year, and the character of the land is such that it retains very little water that can be recovered from the ground by wells. The only alternate source of fresh water is by tanker transport.

During the last war, the armed services needed portable water distilling units, both for sea water and for purification of drinking waters from some areas. This need was met by the Kleinschmidt type of vapor compression distilling units, and a great many of this type were produced. These had extremely small capacities, and their high cost of water production was not important. They served a purpose by providing a compact, versatile unit.

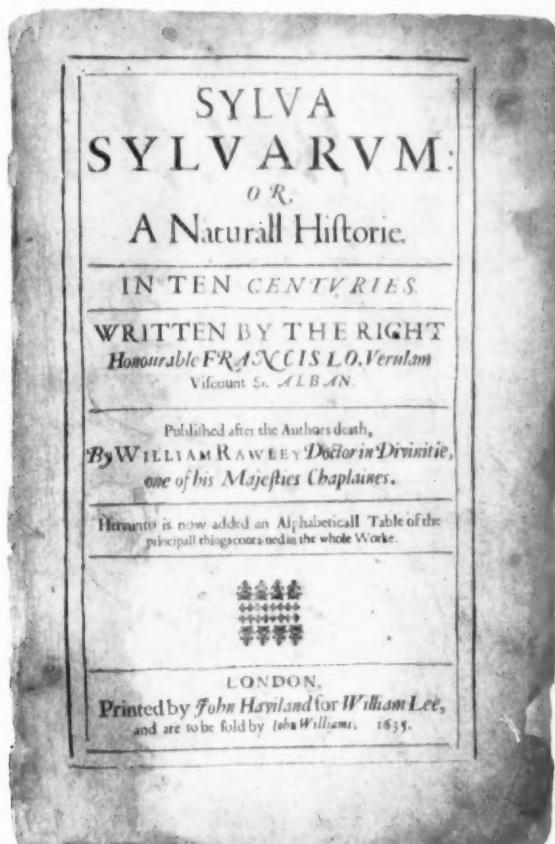
The same principle has been applied since the war at remote armed forces bases where no fresh water is obtainable except by expensive long-haul sea transport — such places as Greenland in the north Atlantic, Wake Island in the Pacific, and Turks Island in the Bahamas. Units of this type also are installed on some offshore drilling rigs.

However, they cannot be considered practical for major supplies for large populations.

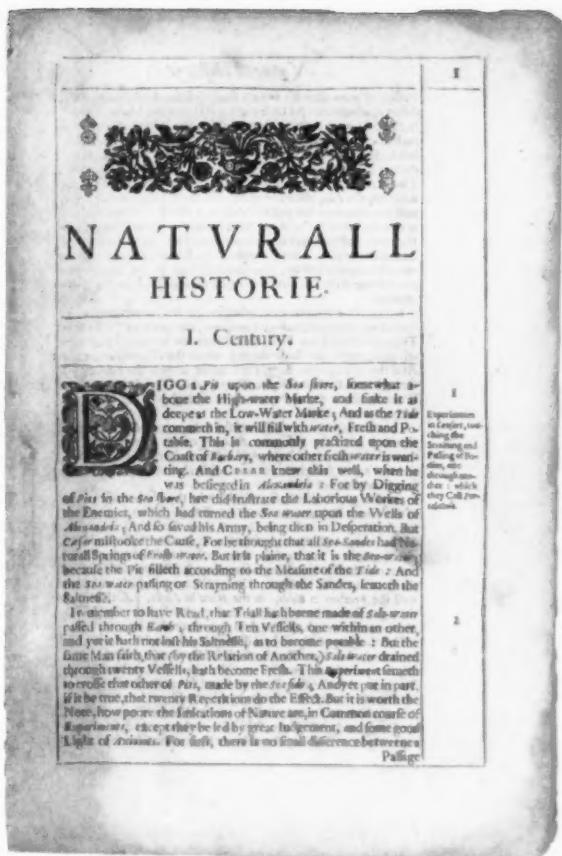
Then, the Sheikdom of Kuwait, on the Persian Gulf, undertook the development of extensive oil fields, and this created a need for a considerable water supply. Kuwait now has distilling plants with an installed capacity of 3-million gallons per day with plans for increasing to 5 million. Their decision to install sea water distillation equipment was forced on them by the extremely arid nature of the area and was encouraged by the availability of oil as a cheap fuel.

#### Progress at Aruba

Early in 1955 the Government of Aruba found that its growing population demanded more water. It ordered a comprehensive economic and engineering survey made of all known techniques of sea water conversion. The resulting report recommended a combined water and electric generating plant, for both of these services were needed for the growth and potential development of their island. By this combination, water costs can be lower than from a distilling plant operated alone. Coupled with



TITLE PAGE OF THE 1625 BOOK BY FRANCIS BACON.  
HIS FIRST CHAPTER IS ON FRESH WATER FROM SALT.



BACON HAD THE MORE SCIENTIFIC APPROACH, BUT HIS CONJECTURES WERE NOT AS SOUND AS CAESAR'S.

considerable advances in evaporating equipment design, as compared to the original installation 20 years ago, it is expected water costs will be nearly halved. This reduction of costs will permit the Aruba Government to sell water to the big oil refinery of Lago Oil and Transport Co. (at a price that is better than Lago currently pays). Lago's present sources are the recoveries of waters from their oil refining operations, water from an older distillation plant, and the final recourse of bringing in fresh water by tanker from Panama.

The number of land-based installations now is growing rapidly. Smaller installations recently have been ordered for Gibraltar, Ecuador, Bermuda, and St. John, V.I. Larger plants are under way in Kuwait, Aruba, Curacao, and Peru. The Bahamas recently ordered a 1-million gpd plant.

Without exception, these plants are based upon one of the three major distillation processes:

- Submerged surface evaporators
- Flash evaporators
- Vapor compression

Many new processes, some of them already in the pilot plant stage, are being developed, but since

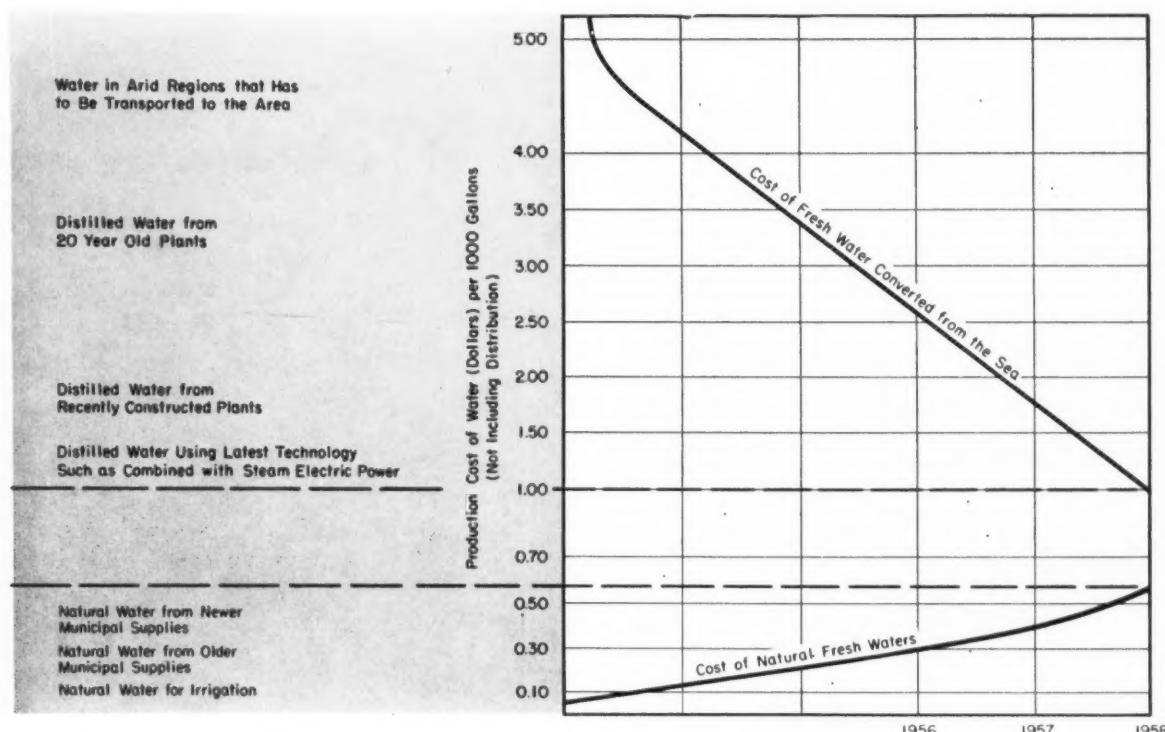


CHART SHOWING COMPARISONS OF COSTS OF NATURAL FRESH WATER AND FRESH WATER CONVERTED FROM THE SEA.

none has proved itself commercially on a large scale, cost analyses must be limited to the three distillation processes.

#### Costs — Some Definitions

How much does water from a complete sea water conversion plant cost? A bewildering range of figures have appeared in print. One reason for their disparity is that proponents of different schemes have used widely differing methods of computing costs. This situation has been partially clarified by the Office of Saline Waters (OSW), an agency of the U.S. Department of Interior. The OSW was created to implement an authorization, which Congress gave the Department in 1952, to embark upon a comprehensive study of the conversion of saline waters to fresh water.

The OSW soon discovered that it could not obtain valid comparisons of processes without some sort of standardized cost analysis. It therefore set up standards for figuring operating costs, including:

- ¶ Capital charges for amortization and interest were to be included, and standard rates were set for amortization at 5 percent and interest at 3 percent.
- ¶ Fuel was to be based on 50¢ per million Btu.
- ¶ Labor was to be figured at \$2.50 per man-hour.
- ¶ Maintenance was to be charged at 3 percent.
- ¶ Insurance was to be taken at 1 percent.

This has greatly helped to bring some semblance of logic to cost data. The standards do not, how-

ever, take into account those factors that vary from plant to plant, depending upon local conditions, and yet are important enough to invalidate any cost calculation that ignores them. On the Aruba project, for example, the manufacturer's factory price for the complete water conversion equipment represented only 40 percent of the total project cost.

Each installation must be studied individually. A few of the variables apt to be encountered will illustrate the pitfalls often overlooked in estimating the cost of a proposed plant or a new process. Small conversion units can be bought as package plants, complete with pumps and piping. Housed in a small corner of an existing industrial or water supply plant, they require no building construction. Often they can be connected to the nearest electrical outlet or steam header. It would be misleading to scale up the price of such small-sized installations.

Steam for distillation plants and electricity for other processes should reflect the full charges for this energy. If boilers or generation equipment are needed as part of the installation, their costs must be properly capitalized and included.

If capital charges cover one set of equipment, what about spares? Can an isolated plant in a remote arid region depend on one boiler or one electric generator? Fortunately, water is a product that can be stored. Storage facilities can cover breakdown and repair periods to some extent so the need for duplicate or spare equipment is reduced.

But, the costs of water storage should be included in capital charges.

Distilled water is slightly acid and has a bland taste that most consumers find unpleasant. Neutralization and aeration help to correct these conditions. Here, too, is an addition to capital costs.

These miscellaneous items often are overlooked:

- || Land acquisition
- || Special foundation work such as the blasting of coral and pile-driving
- || A protected salt water intake
- || Waste brine disposal
- || Offices, shops, and storehouses
- || Road systems and yard lighting
- || Fuel transport, storage, and handling

So the creation of an actual operating plant requires many items often not included in the cost proposals for water conversion schemes. Despite the standardization of major items, there is still a possibility of incompatible cost comparisons as a result of failure to include some of these factors.

Of course, there are many situations where some of these items are already available, especially if a water conversion plant is to be built as an adjunct to an existing plant.

#### Costs — A Yardstick

To obtain a factual picture of the cost situation today, we can examine a plant that already has been designed and for which investment figures are available. Later, by comparisons with this yardstick, we can measure the savings possible when local conditions are favorable and when recent technical developments are considered.

For this yardstick, the Aruba installation serves excellently. Its size is great enough to permit scale-up for the larger plants which are almost certain

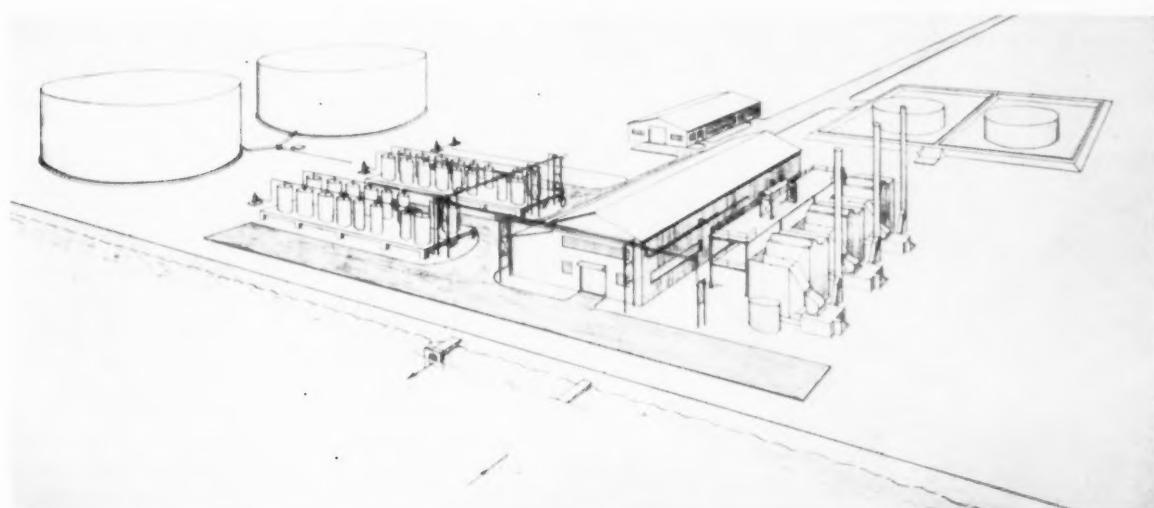
to materialize in the near future. And it offers conditions more likely to be typical than those of most other installations.

At Kuwait, for instance, the extremely low cost of the available fuel did not justify high efficiency equipment or other cost-cutting devices such as a water-electric plant combination. Aruba, on the other hand, must buy its fuel oil at the refinery price without subsidy. And Aruba's plant is the sole source of fresh water for a community of 55,000, complete with commercial establishments, hotels, public buildings, and even a hydroponic farm. Since the plant is the sole fresh water source, it has all of the reserves and spare equipment considered proper for a reliable public utility. For these reasons it offers a fair example for others considering a sea water conversion plant.

The Aruba plant is designed to produce 2.7-million gallons of pure water daily, and in addition, to generate 12,500 kw of electricity from 15,000 kw installed capacity. Its capital cost, upon completion in 1958, is expected to total \$10.6 million.

The investment cost per daily gallon of installed water capacity at Aruba is therefore about \$4.00. But the electrical generating equipment represents a substantial part of the investment. If it were not required, \$3.00 to \$3.50 per daily gallon of water capacity would be a fair estimate of the capital investment for the water and steam plants alone.

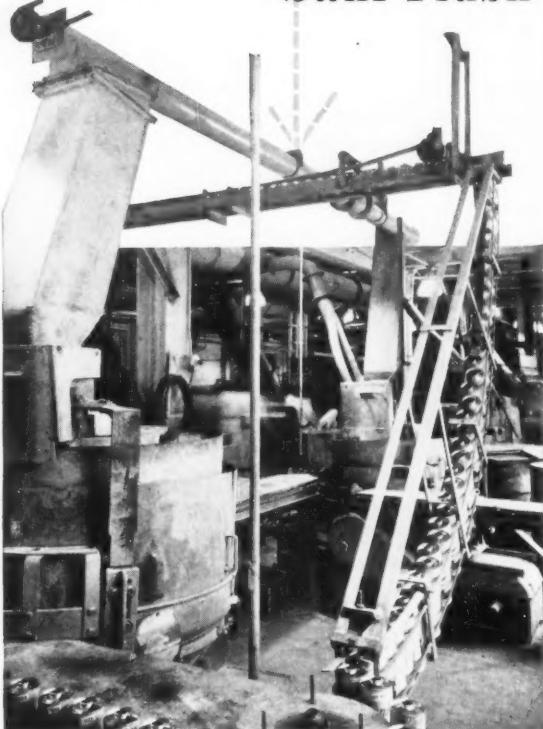
Then look at the operating cost of production of the pure water — defining this cost as being "from the plant" and not including such factors as distribution, metering, and accounting costs which must be added to obtain the consumer's rate. The Aruban government has estimated production costs at half the \$3.50 per 1000 gallon operating cost for water from the existing plant. This indicates a cost



THE NEW SALT WATER CONVERSION PLANT AT ARUBA COMBINES BOTH A DISTILLATION AND A POWER PLANT.

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of about \$1.75 per 1000 gallons for the new plant. But \$1.75 is not a true figure. Since the by-product electric power is produced very cheaply, the profits from its sale can be applied against operating costs for the whole plant. When power revenues at Aruba are included, a more exact picture of water costs will emerge.

**Are Yardstick Costs Current?**

The Aruba plant costs were computed almost two years ago. Will they hold for estimates today?

The cost of basic materials, equipment, and construction have been rising constantly, as evidenced by the accepted cost indices which show a 9 percent increase for the past two years. Despite this, technological improvements in sea water conversion equipment point to lower capital costs for a plant ordered today. There are at least six major suppliers of equipment (five in the U.S. and one in Scotland) who now are prepared to quote on large-sized plants of a million gallons per day capacity and up. These leading manufacturers all have improved the design of their process and the materials of construction. As a result, it can be said that distilling equipment costs have been reduced by 15 to 30 percent. This should more than balance the rise of other capital costs.

We feel that the capital investment for a large-scale, combined water-electric plant built today would be \$3.00 to \$3.75 per daily gallon of capacity.

All cost references have been to a combined water-electric plant. This yardstick plant will have an over-all operating cost of \$1.75 per 1000 gallons of pure water, roughly divided as follows:

|                                  | Per 1000 Gallons |
|----------------------------------|------------------|
| Fuel                             | \$.80            |
| Capital charges—water plant      | .50              |
| Capital charges—electric plant   | .15              |
| Labor, maintenance, and supplies | .30              |
| Total operating cost             | <u>\$1.75</u>    |

Now, a large part of the cost of water from a distillation plant comes from the cost of low pressure steam. But high pressure steam costs relatively little more to produce. And unlike low pressure steam, it can be used efficiently to generate electricity. After passing through the turbines, it can be exhausted to the water distilling plant to produce fresh water. In this way, the steam is used fully, and its maximum heat content is put to work.

In effect, electricity is produced as a by-product of the water distillation process. The table shows that the cost of turbo-generators and the extra cost of high pressure over low pressure boilers is only 15¢ per 1000 gallons of water produced. The electricity produced will cost about 3 mills per kilo-watt-hour, compared to 8 mills or more for conventional power plants.

Here is a way of cutting water costs sharply. With boilers operating at moderately high pressures, a

million gallon per day water distilling plant can yield 4000 kilowatts, or nearly 100,000 kilowatt-hours per day of by-product power. If this power can be sold at one-half cent per kWh profit—a modest assumption, since the suggested wholesale price of 8 mills per kWh is easily competitive in most areas where water is scarce—the total profit is \$500 per day, or 50¢ per 1000 gallons.

The table of costs now looks like this:

|                                     | Per 1000 Gallons |
|-------------------------------------|------------------|
| Operating costs from previous table | \$ 1.75          |
| Less credit for electrical sales    | .50              |
| Net operating cost for water        | \$ 1.25          |

The cost advantage of a water-electricity utility plant instead of just a water plant are obviously well worth the extra 15¢ investment cost.

Now that the full picture of yardstick plant operating costs has been developed, it must be brought up to date. Since it has been stated that current investment may be held down to \$3 per daily gallon of capacity, the capital charges forming part of operating cost are reduced by 25 percent, or from 65¢ to 49¢ per 1000 gals. Similarly, efficiencies of present day equipment are easily 10 percent better than equivalent equipment two years ago. This cuts 10 percent of the fuel cost—from 80¢ to 72¢ per 1000 gallons. So comparing factors of operating cost of the yardstick plant with a plant begun today, we have:

| Yardstick Plant                         | Current Plant     | Per 1000 Gallons  |
|-----------------------------------------|-------------------|-------------------|
| Fuel cost                               | \$ .80            | \$ .72            |
| Capital charges                         | .65               | .49               |
| Labor, maintenance,<br>and supplies     | .30               | .30               |
|                                         | <hr/> <u>1.75</u> | <hr/> <u>1.51</u> |
| Less credit from sale<br>of electricity | .50               | .50               |
| Net operating cost                      | <u>\$1.25</u>     | <u>\$1.01</u>     |

Here we have \$1.00 per 1000 gallons of water—perfectly feasible in many locations although local factors still will control. But \$1.00 is only a start for intriguing studies of further cost reduction!

#### Costs Under the \$1.00 Mark

There are a number of opportunities today where local conditions favor the conversion of sea water at lower costs than the \$1.00 per 1000 gallons.

It already has been shown that if by-product electric power sales yield  $\frac{1}{2}$  cent profit per kilowatt-hour, the cost of water is reduced 50 cents per 1000 gallons. Each additional mill of profit reduces water cost by 10¢ per 1000 gallons. So if the cost of by-product power is 3 mills/kwh, and it is:

sold at 8 mills/kwh—water cost \$1.00/1000 gals  
sold at 9 mills/kwh—water cost .90/1000 gals  
sold at 10 mills/kwh—water cost .80/1000 gals

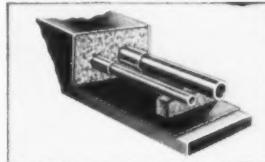
Another wonderful possibility is opened wherever there is an existing steam power plant at the lo-

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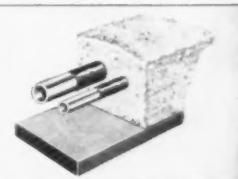


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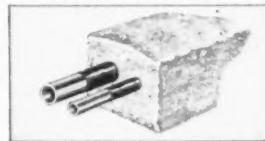
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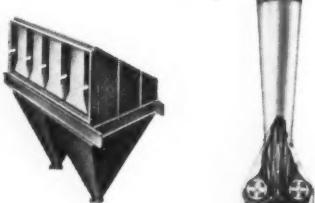
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cation needing water. These plants generally have spare boilers, retained for stand-by, that can make steam for the water plant. They still will be available for stand-by duties because water production can be shut down in an emergency.

Similarly, spare turbines can be converted to supply the water plant with, at worst, only a small reduction in their available capacity.

Here is a chance to put idle equipment to work. The water plant benefits by not having to absorb the full capital charges or labor costs.

Then, too, all the service facilities of the power plant can be made available to the water plant. The savings possible with a combined operation can reach from janitors to top management.

The \$1.00 cost per 1000 gallons of water is based on oil costing 6¢ per gallon. In some locales it is cheaper. Some oil-producing countries can obtain fuel at very low prices—either from their own wells or as part of a concession granted to foreign operators. Over-all water costs then will show a marked reduction.

| Per 1000 Gallons     |
|----------------------|
| Oil at 6¢ per gallon |
| Oil at 5¢ per gallon |
| Oil at 4¢ per gallon |

Labor is also an important factor. In low labor-cost areas, perhaps as much as 10¢ per 1000 gallons can be saved.

Where diesel electric plants already are installed, the exhaust gases usually go to waste. Heat from these gases can serve a water distillation plant, and its fuel costs then become virtually nothing.

There may be other possibilities for savings. Most of them are peculiar to a particular site. Only a comprehensive survey of all factors involved can disclose them and their exact effect upon cost.

### Progress in Processes

Examples and calculations have been limited to the major distillation processes. What about the many other processes under investigation in this country and abroad?

The recent Symposium on Saline Waters\* brought together a summation of American research on many processes as well as the disclosures of numerous scientists from abroad. It was evident that excellent progress has been made.

Of particular interest were reports on pilot plants under construction using both surface type and vapor compression type stills.

At this point the all-important distinction between sea water and brackish water must be emphasized, for some processes are effective with one but not the other. The waters of the ocean contain

\* Nov. 4, 5, and 6, 1957, at Washington, D.C., sponsored jointly by the Office of Saline Waters, Department of Interior and the National Academy of Science.

an average of 35,000 parts per million of dissolved salts. The concentration in the Persian Gulf is 40,000 ppm, in Chesapeake Bay about 15,000 ppm, and in the Baltic Sea a mere 7000 ppm. Brackish water, by accepted definition, has a salt content less than that of oceanic waters but greater than potable waters. This places brackish water in the 1000 to perhaps 10,000 ppm range.

Because it holds such promise for low cost treatment of brackish waters, electrodialysis processes received unusual attention at the meeting. In electrodialysis, the salt concentration of saline waters is reduced by means of membranes and electric currents. Small plants using this process have been in operation for several years, and a 3.6-million gallon per day plant has been authorized for South Africa. This plant will reduce the salts in water pumped out of gold mines from 4000 ppm to 500 ppm, thus alleviating a major mining problem while producing domestic and irrigation water. With cheap electricity conveniently available, cost of the final product has been estimated as about 29¢ per 1000 gallons.

There is no doubt that full salinity sea water can be converted to fresh water by this method as has been demonstrated both by the leading American manufacturers and by Europeans. However, this becomes so involved and expensive that the developers of this process are concentrating primarily on treatment of brackish waters.

Distillation processes using solar energy always arouse interest, for many arid regions have an abundance of sunshine. The practical application of solar energy has been well demonstrated by many installations for hot water heating and home heating. But turning water into steam for distillation requires much more heat. It is perfectly feasible—but the intensity of solar energy is at such a low level that a very large area of absorbing surface is required. With presently developed apparatus, projected operating costs are too high to compete with distillation.

Processes employing freezing have excellent technical promise and have proven successful in small installations. But no process has been disclosed that indicates present day, large-size, availability at costs comparable to other systems.

Several other processes discussed at the Symposium are still in the development stage, quite removed from large-scale commercial operation.

What about nuclear energy? As a source of heat for distillation processes, there is considerable promise, especially with the so-called low-level type reactors using the less expensive fissionable fuels. Obviously, with the cost of fuel as the largest single factor in the cost of converting water by distillation, a cheap heat source would really open up this field. To date, however, nuclear reactors have not reached the stage of development where they

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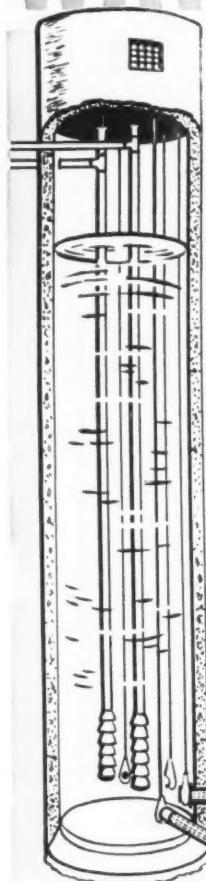
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#### Outlook for the Future

The steady, continual improvement of the distillation processes seems certain in the near future. As an analogy, take the electric power industry from its early boilers, steam engines, and generators of the 1890's to the efficient giants of today. That was accomplished by many people and gradual development. There was no radical "break-through," and even the advent of nuclear boilers is being assimilated by the power industry as just another step forward.

So, unless there is a radical discovery by which all the solids in sea water can be extracted as though by magic, the gradual development of the distillation processes, especially where coupled with by-product electric power generation, can be looked for in the years ahead.

Note that only the heat consuming distillation processes permit generation of by-product electricity. Other processes require electric energy input, yet in many lands needing water, electricity is neither cheap nor plentiful.

What real promise is there then in the distillation processes? Plenty, according to discussions at the Saline Water Symposium.

#### Scale and Corrosion

The two real devils that have hampered progress are scale and corrosion. There is also a need for improvement in methods of heat transfer. Several speakers indicated that present means of heat transfer, through metals and hindered by films, could be improved easily fivefold—and theoretically much beyond that.

The earliest improvements are likely to be in the use of corrosion resistant materials of construction. Both cast iron and monel have proven their worth. Costs are high for monel, and in fact for cast iron, which must be used in heavy masses because of its low strength.

Everywhere progress is being made. Less expensive metals are being produced that will stand hot salt water attack. Thinner and thinner layers or even films of the corrosion-resistant metals, backed by cheaper steel for strength are proving themselves. Finally, there are vast possibilities for nonmetallics—plastics or plastic linings, glasses, and even ceramics.

The second field of potential improvement lies in scale prevention. In the early days of salt water evaporation, the hard deposits of scale that formed on heating surfaces had to be knocked off by hand. Then came the mechanical trick of making flexible heating surfaces which, when quickly shocked by cold water took a different bend, so that the hard brittle scale was cracked off. This now is used wide-

ly, and if done at frequent intervals, restores the heating surface to about 90 percent of its original efficiency.

More recently chemical additives or treatments have so altered the scale forming constituents that they do not deposit heavily on heating surfaces. This permits continuous operation of stills at full effectiveness. Both American and British firms produce compounds of this type that are now in widespread use in marine applications and are successful as long as boiling temperatures in the first stage evaporator are held below 185 F. This is sufficiently high for marine use or for land-based evaporators where fuel is cheap. A British manufacturer has developed another type of chemical treatment that extends the top limit of boiling temperature to well over 212 F. This treatment has been used on evaporators at Curacao for over three years without scale.

The importance of temperature limit on the future improvement of distillation processes may be more readily appreciated by again referring to the analogy with the steam cycle in the electric power industry. The low end point is where the steam, having given as much energy as possible to the turbine-generator, must be condensed by cooling water. With the distillation cycle, too, the lower limit is set by the final practical heat transfer temperature of the sea water.

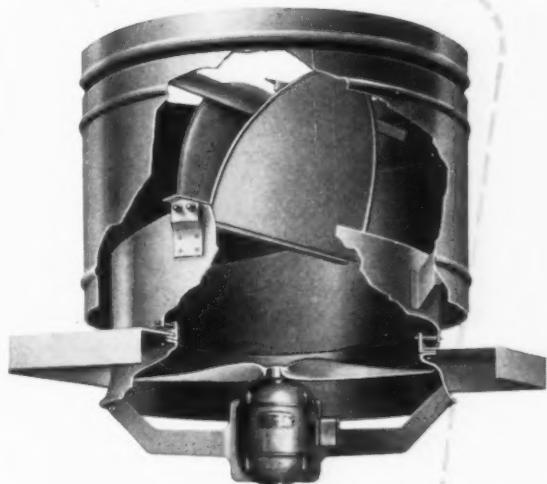
As to the upper end of the scale, the power industry has pushed steam pressures and temperatures to 5000 psig and 1200 F. This greatly extends the range of their process and permits much more work to be done by the steam before it is condensed. If distillation processes could handle salt water at 250 F, 300 F, or more, without scaling or corrosion, it would greatly increase the effective working range of the process, permit more stages of evaporators to be used, and increase the yield from the present five to six pounds of distillate per pound of steam to 8, 12, or even 16 pounds. The net result would be a substantial reduction in the use of fuel, which is the biggest single factor in the total operating cost.

Improvements in heat transfer techniques will lessen the size and cost of equipment required, and this lower cost equipment will justify extra stages to reduce fuel costs.

#### Conclusion

The outlook for the future is bright to those who are working to close the gap between the cost of fresh water from the sea and the cost of fresh water from increasingly distant natural sources. There are places today where sea water conversion plants are economically justified. As their number grows, their operating experiences will help the engineers and scientists make the sea a source of fresh water for more and more people. ▲▲

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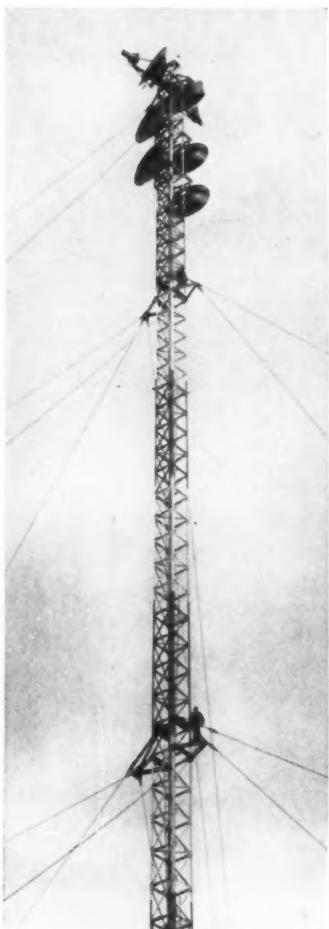


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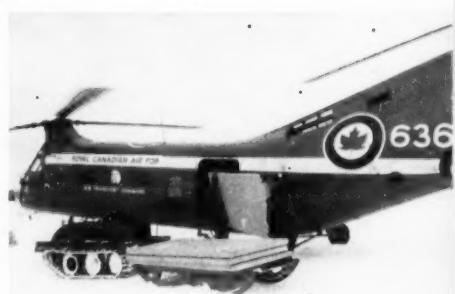
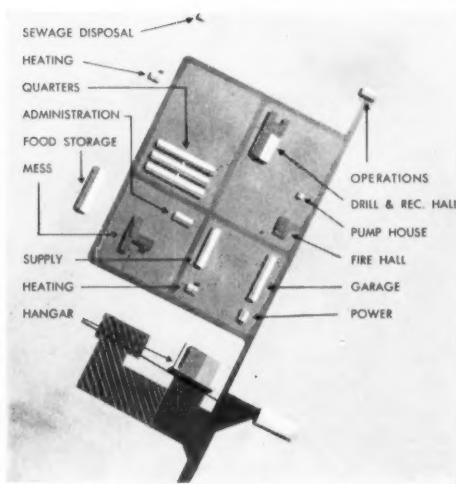
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# Financial Planning for Your Clients' Industrial Construction



ARTHUR E. ROWE  
Consulting Engineer

Arthur E. Rowe attended Cleveland College and took collateral courses at Case Institute of Technology and John Huntington Institute. He had been in responsible charge of major projects for 12 years prior to opening his own office. Since its founding in 1941, the firm has handled over 1200 jobs, mostly industrial. Among the most important were: a taconite mining and concentrating development, a bearing manufacturing plant, an elec-

trical motor and equipment plant, and major facilities for automotive and other manufacturing operations. He is a registered professional engineer in Ohio, Pennsylvania, West Virginia, North Carolina, and Minnesota, and a member of the American Society of Civil Engineers. He has served on Building Code Committees and the Cleveland Board of Building Standards and Appeals. He has held offices in the Ohio Society of Professional Engineers.

WHEN AN ENGINEER THINKS of reducing costs on a project, he generally thinks in terms of improved design or a more

**Cp exclusive** efficient use of material and labor; however, with a little thought and analysis and with the help of an attorney or an accountant, even more important savings often can be made—tax savings that are provided for by law. The larger industrial concerns, who do a lot of building, generally do not overlook the opportunity to make these savings, but a surprising number of smaller clients are not aware of the possibilities.

## Federal Taxes

Capital is an accumulation of cash or other assets on which income tax has been paid. Permanent improvements—buildings and building equipment, or apparatus installed complete—are considered capital assets. These assets may be either real or personal property.

Amortization of capital outlays is regulated by a depreciation allowance which is set by law. Thus a facility with an estimated life of 30 years would be permitted an annual allowance of 3½ percent of the original cost. A facility with a 10 year life would have an allowance of 10 percent per year, the theory being that only this amount can be written off as

cost or expense during each year of equipment life. This limits the rate at which a capital investment can be recovered.

Generally speaking, inflation has caused depreciation allowances to fall far short of replacement cost and they do not allow for obsolescence. This has the effect of overstating profits and making heavy demands on capital funds that are frozen for long periods. In an effort to operate without continually increasing capital outlays, recourse is made to lease back, lease purchase, and other deals that conserve capital but increase fixed charges.

## Expense Items Defined

Expense, as defined by the revenue service, generally is limited to costs incurred in the operation of a business or costs that do not result in the acquisition of additional permanent facilities.

A company making a good profit and paying 52 percent corporate income tax wants as many disbursements as possible to be classified as expenses, for expenses can be charged against current profits, thereby reducing the tax. Capital expenditures can only be charged against income piecemeal, at the permitted amortization rate. An expenditure of \$100,000, for example, could all be deducted from profits before figuring income tax if it were an ex-



pense item. Only a fraction of the \$100,000 could be charged off in any one year if it were considered a capital investment.

#### Which Are Expense Items?

Rearrangement of facilities, for instance, would be an expense item rather than a capital investment, and there is usually not much argument about maintenance and repair being expense. The usual rule is that replacement up to 50 percent of value is repair. Construction, as opposed to rearrangement of facilities or maintenance, is considered a capital investment if it results in acquisition of permanent assets, which might be either real or personal property. The normal costs of construction, then, should be capitalized.

Demolition, on the other hand, usually results in eliminating assets. The cost of demolition is an expense, but the value of the item eliminated is a charge to be added to the depreciation account.

Classification of other costs of construction as capital or expense items may be more difficult. Suppose there is to be an addition to an existing plant. There might be utility lines overhead or underground to be relocated. There might be scrap bins and auxiliary buildings, such as meter, oil, or paint houses to be relocated. Perfectly good loading and receiving docks might have to be moved. These make-ready items would be expense, as the cost of moving would not add value to the completed job but would merely maintain present values.

Sometimes the acts of public officials add to the costs. The city might require that provision be made in foundations for a future underpass. Or because of a failure to provide sewage facilities when promised, temporary expedients may have to be used, only to be abandoned after a short time. These are expense items.

The neighborhood might be such that fences and watchmen would be required during construction. This is not a normal cost item and does not add to value. It therefore would be an expense.

#### Rushed Projects

Construction may have to be rushed for some reason, and this may result in increased expenses. Assume construction time for a certain job would normally be one year, but in order to expedite the work so as to complete the facility in 9 months, certain expenses may be incurred. These might be premiums for early delivery of certain materials (as steel from warehouse instead of mill). Overtime premium for labor, special protections needed for working in bad weather instead of closing the job down, cost of temporary heat, snow removal or pumping of water, and abnormal expense for excavation or for temporary roads can, under certain conditions, be considered expense items rather than normal construction costs that would have to be

capitalized. Such items should be checked with a lawyer or tax accountant.

The need for keeping a plant in operation while modernization or new addition work is being performed might result in a great deal of expense over a normal construction cost.

The finished job, involving a number of such items, would be worth no more than a normal job, but the additional expense (in order to meet delivery schedule called for by production contracts, for instance) might be 20 percent or so. This would be the expense of obtaining early completion.

#### How Much is Saved?

A comparison might be made as follows for a project costing \$1.5 million.

##### Capitalize All

To raise \$1.5 million after 52 percent taxes a business must earn \$3,125,000.

##### Capitalize Part

|                                   |             |
|-----------------------------------|-------------|
| Make-Ready Expense                | \$ 100,000  |
| Expediting and protection expense | 200,000     |
| Capitalize                        | 1,200,000   |
|                                   | \$1,500,000 |

To obtain \$1,200,000 after taxes,

a business must earn \$2,500,000

Expense items before taxes 300,000

Business must earn \$2,800,000

This results in an indicated saving of \$325,000 of pre-tax income to pay for the job when expense is segregated. This might be the equivalent of \$4 million or more of sales by the owner. Should expense items be a strain on working capital, this could be eased by short term loans at about 5 per-



cent, which would be justified. The interest also would be an expense.

#### Local Taxes

It has become the custom of some local assessors' offices to send out questionnaires as soon as new construction is completed.

These forms ask a number of leading questions, and they usually do not allow for or recognize any expense items. They also disregard the fact that certain items might be personal property (machine foundations, supports, process equipment) which carry a lesser rate than real property. They ask that the form be filled in by a reasonable officer of the company and sworn to. Naturally, if one has not been close to the problems, the tendency is to include all personal as well as real property costs and all expense. Then this combined amount becomes the basis for the assessed valuation—an item as important as the rate in its effect on total tax payments, which will run for years.

This whole problem becomes simplified with proper records and procedures.

All demolished facilities should be removed from the tax records. Personal property and real property should be segregated. Both values should be based on normal cost, exclusive of expense due to special conditions of construction.

In the foregoing example, for instance, the cost to be considered for reaching the assessed valuation of real property is \$1.2 million not \$1.5 million.

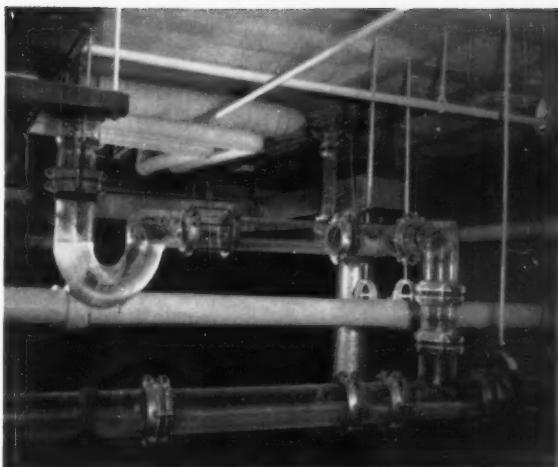
This might be reduced further if craneways, conveyor supports, special structures, and foundations required for and incidental to personal property are involved, since these would be personal property rather than real property. Not only would they carry a lesser rate but they can be amortized faster.

#### What the Engineer Should Do

Financial planning should reflect these considerations so that records and contract documents show the true situation. The total amount of funds required and the time they will be needed usually can be predicted readily, and this is of immense value to the client in anticipating payments.

While engineers in private practice primarily are concerned with study, planning, design, and supervision of construction, I have known of many instances where thoughtful consideration of these financial items alone would justify a consulting engineer's services.

While the engineer has no right to assume the functions of the attorney or accountant, an appreciation of the tax situation as it bears on construction is important. The engineer whose duties bring him in contact with many of these details as the project unfolds is in a position to be of considerable help and can call attention to many items that otherwise might be overlooked.



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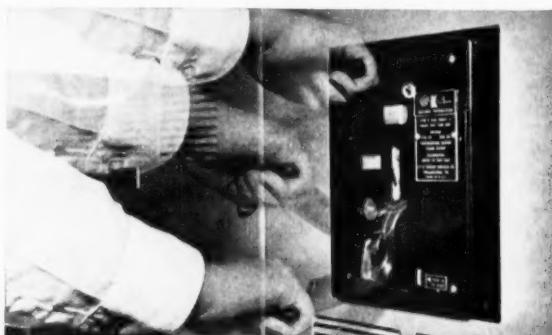
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# I-T-E makes sweeping design advances in new low voltage power circuit breakers, switchgear

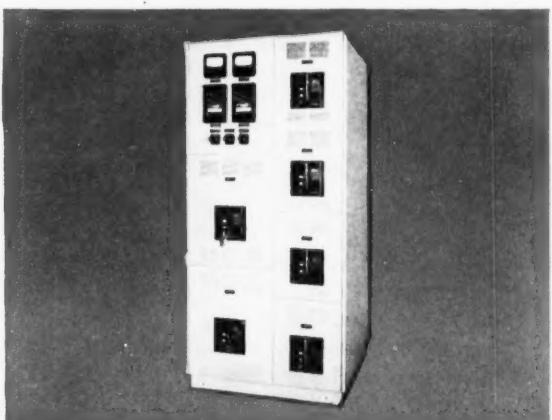


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**First quick-make manually charged stored energy closing mechanism.** First 90% of pulldown handle travel charges spring mechanism, last 10% releases stored energy, automatically closes contacts. No teasing of contacts is possible.



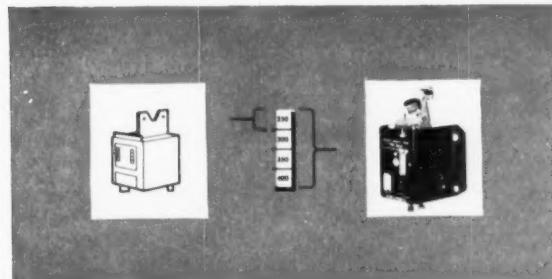
**4-high stacking** of 600 amp frame size circuit breakers in 90-in.-high enclosures. The new circuit breakers are as much as one-third smaller and 55% lighter than comparable units. The new switchgear is the smallest ever designed.



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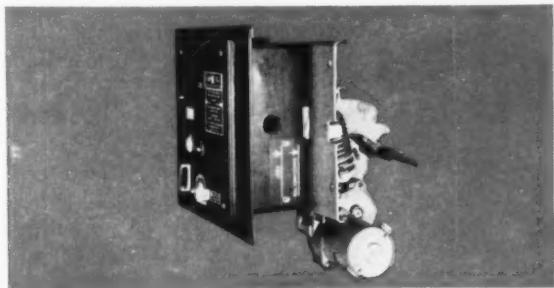


**Greatly increased accessibility to component parts** for operation and servicing. For example, trips on electrically and manually operated breakers are out in the open and can be easily adjusted. Trips also can be changed quickly. One-piece molding holds trip units, which are changed from the rear and in a fraction of the time formerly required.

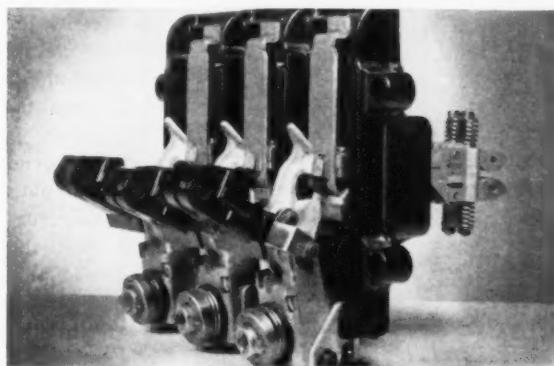


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**I-T-E CIRCUIT BREAKER COMPANY**

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# Ideas for Feed Pump Suction Design

A. E. KITTREDGE, President  
American Water Softener Company

IF A BOILER FEED PUMP suction system is to operate properly it must maintain adequate net pump suction head at the eye of the impeller regardless of changes in flow rate, pressure, and temperature.

C<sub>exclusive</sub>

This at first seemingly simple problem is greatly complicated by several factors. First, the steam pressure existing at the bleed point serving the deaerator is subject to rapid variation with load, and to a violent rate of pressure declination in the event of sudden closure of the inlet main throttle valve by the overspeed trip. Other factors also enter into the picture, and these are best understood by studying the illustrations.

## Fundamental Considerations

Fig. 1 shows the physical relationships of the various elements involved in a deaerating feedwater heater and its connection to the boiler feed pump. Figs. 2 & 3 provide a graphical representation of what takes place in the system, on a purely qualitative basis.

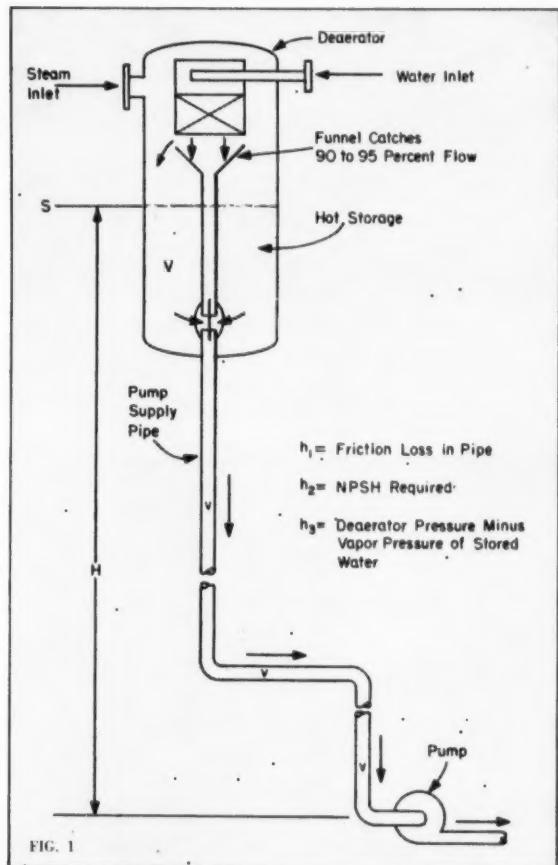
A basic understanding of the problems involved can be had from Fig. 2 which shows the flow path of a single particle of water from the water surface in the feedwater heater to the eye of the boiler feed pump down a vertical pipe. On this chart, the lines are defined as follows:

S—physical level of the water surface in the heater storage section as the level from which net pump suction head in feet of water is measured.  
A—operating pressure head loss of the deaerating heater for the duration of time required for a particle of water to pass from the tray system to the eye of the impeller.

B—Theoretical flow rate.

C—Actual flow rate. Note that fluid friction in the pipe, by slowing the passage of the individual particle, shifts the curve upward from the theoretical rate value (line B) to the actual value (line C), and this raises some special problems in pipe sizing for practical layouts.

The difference between line A and line C is the net pump suction. As can be seen, adequate net



pump suction head must be maintained under every operating condition to prevent flashing in the system. This means correlating the volume of deaerated water storage with the total volume of pump suction piping to control time rate of particle flow. The gross physical head from the water line in the pump suction piping to the centerline of the boiler feed pump must be sufficient to provide NPSH regardless of the cumulative effects of falling inlet pressure, increased boiler feed demand, and pipe friction.

Fig. 3 repeats the elements of Fig. 2, modified to show the conditions that exist when some sections of the pump suction pipe are horizontal—of necessity the usual layout in most plants. Plotting the particle path as head against time we again see that the actual curve C (allowing for pipe friction head loss) must fall below the effective surface line A. The pipe friction head loss can, under certain conditions, lead to flashing in the horizontal pipe section, as shown when section c<sub>2</sub> crosses line A.

## Approaching the Solution

The first step in the solution to this problem was made in the early 1940's when it was discovered that pump suction flashing resulted from poor steam inlet control on what was intended to be a constant pressure deaerating heater.

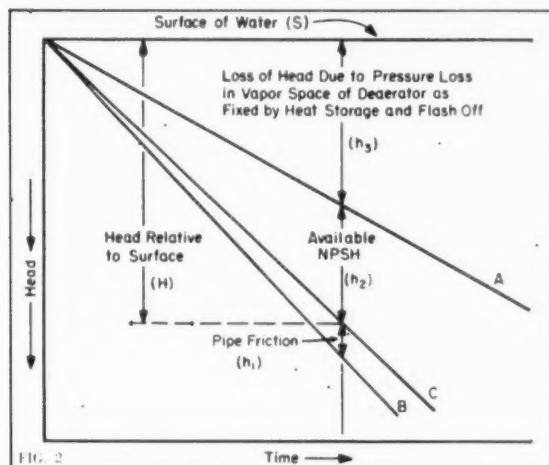


FIG. 2

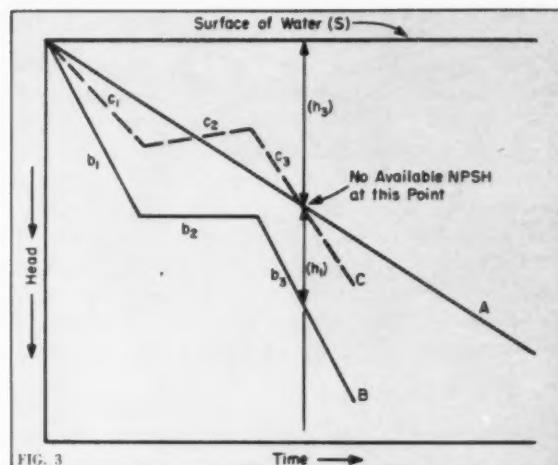


FIG. 3

In this instance the flashing condition was corrected by installing a funnel of minimum storage volume in the deaerator to take all of the water leaving the tray section. The bottom of the funnel was equipped with a downcomer that conducted all of the water to a point in close proximity with the boiler feed pump suction connection near the bottom of the storage tank. Under normal steady loads, this arrangement provided direct flow from the tray section to the pump suction. The tank section of the deaerator remained in communication with the flow path only through the void between the downcomer and the suction line connection, and it became essentially isolated storage.

When sudden increases in the boiler feed demand occurred, usually accompanied by a sudden loss of boiler steam flow coincident with sudden loss of turbine load and bleed stage operating pressure, the instantaneous increase in the flow would come from this isolated storage section. This served to quench the flashing tendency of the water going directly to the pump suction. In addition, the increase in boiler feed rate and the consequent lowering of the level in the storage section would open the water inlet control valve and would demand more steam from the then inadequate steam source.

#### Two Phenomena

Two phenomena undoubtedly contributed advantageously to the situation. First, partial isolation of the storage section from the normal supply path permitted flashing or boiling to occur in the storage section to help maintain heater operating pressure without disturbing the head on the pump suction flow in the collecting funnel.

Second, the water in collecting funnel and the suction line was instantaneously and continuously at the saturation temperature corresponding to the pressure of operation, thus decreasing the tendency for flashing in that direct flow path. In addition, although it was not recognized immediately, much of the advantage of the arrangement also resulted

from the temperature depression of the stored water. With a sudden increase in boiler feed demand after a period of steady load operation, a supply of cooler water was available for the boiler feed pump.

#### Further Study

The success of this system has led to subsequent study of the directed flow principle and its potential for further development. Referring back to Fig. 2, we can look at the determination of NPSH for the system in another way. The minimum net pump suction head required by the boiler feed pump itself is established by the manufacturer and is a precisely known value. Friction in the pump suction piping can be determined with equal accuracy, and the minimum total head required for static operating conditions is the sum of these two values.

Sufficient additional suction head must be provided, however, to cover transient conditions involving a continuous reduction of deaerator operating pressure and corresponding reduction of saturated water effluent temperature. A single particle of water under examination must be at a pressure at least equal to the sum of its own vapor pressure and the required NPSH of the pump when it reaches the eye of the impeller. This additional head for transient conditions is, therefore, the operating pressure head loss of the deaerating heater, measured in feet of water, for the duration of time required for a particle of water to pass from the tray system to the eye of the impeller of the pump.

Pressure loss of the deaerating heater is controlled by several factors: the amount of heat available from the storage section as flash steam; the operating temperature head on the deaerator, inlet to outlet; and the instantaneous rate of pressure change, expressed in feet per degree F, corresponding to the maximum effluent temperature from the deaerator. With a funnel arrangement, the pressure loss is measured for the time required for a particle of water to traverse the path from the level in the collecting system to the centerline of the boiler feed

pump. This additional head must be supplied over and above the minimum requirements of pipe friction and pump NPSH.

Uniquely, the load carried on the feedwater system cancels out of consideration. It has equal and opposite influence on the rate of pressure declination in the deaerator and the time during which a particle of water is resident in the suction pipe. A high load speeds up the rate of pressure declination but decreases the time during which a particle of water is in the pump supply system.

### The Basic Equation

Based on these considerations, we derived the following equation to facilitate the design of suction systems with directed flow deaerators.

$$V = \frac{v \times {}^{\circ}F \times I}{H - (h_1 + h_2)}, \text{ where:}$$

$V$  = minimum storage volume, in cubic feet, required to avoid flashing at pump suction.

$v$  = volume, in cubic feet, of pump supply system from surface of water in collecting funnel to eye of pump impeller.

$I$  = instantaneous rate of pressure change, in feet  
 ${}^{\circ}F$  = maximum temperature rise in deaerator.

per degree F, at maximum operating temperature of deaerator (taken from steam tables).

$H$  = total head from water surface in deaerator to centerline of boiler feed pump.

$h_1$  = pipe friction at maximum rate of flow.

$h_2$  = net positive suction head required by boiler feed pump at maximum rate of flow.

While this formula covers the basic design requirements, attention is directed to one additional factor that will vary with the arrangement of the system. It is true that substantial isolation of the storage volume of a deaerator permits delivery directly to the pump of water saturated under the instantaneous pressure of operation. This also prevents ebullition of the storage section from interfering with the effective head on the supply system. However, temperature depression in the storage volume in relation to the saturated effluent temperature from the deaerator would not seem to be desirable. The only way the storage section can control the rate of pressure declination in the deaerator is by supplying flash steam immediately when the bleed source is cut off.

If the tank is isolated to the extent that the average stored water temperature is below the effluent operating temperature of the deaerator, loss of steam supply would precipitate a correspondingly sudden declination of pressure to the pressure corresponding to the actual temperature of the stored water.

This condition can be avoided in several ways. One more desirable arrangement would seem to be to have most of the output (90 to 95 percent) of the

deaerator go directly to the pump supply through the small volume collecting funnel. The balance of the total tray section discharge then could drop directly to the surface of the storage section to maintain the water in storage at full saturation temperature. A small recirculation line from the boiler feed discharge also may prove helpful.

Where the storage tank is substantially isolated and permitted to float on the line at substantially depressed temperature, one additional deduction should be taken from the total head  $H$  in the equation. This factor, designated as  $h_3$ , is the deaerator pressure minus the vapor pressure of the stored water (at maximum operating conditions).

### Conclusions Justified

Discussing this formula with consulting engineers and operating men seems to have justified our conclusion that the problem is worthy of further consideration. While there is awareness in some places of the advantage of low volumetric capacity in the pump supply system, up to the present time there has not been any available means of making a direct correlation of the variables, such as is offered by the equation. Prevailing opinion still seems to follow the thought that the solution of this problem is best satisfied by using a low pump suction velocity (1½ to 2 fps) and all the head that can be obtained within the building limits.

There is, of course, no objection to using all of the head available, but the belief that a low pump suction velocity is always desirable is completely fallacious. For example, consider a 1,000,000-lb per hr deaerator operating with an effluent temperature of 300 F, serving a boiler feed pump requiring 30-ft NPSH and installed with a 50-ft total head. If a 24-in. connecting pipe with a velocity of 1.62 fps is used between the deaerator and boiler feed pump, 2000 cubic feet of storage is required. If a 12-in. connecting pipe with a 6-fps velocity is used, only 600 cubic feet of storage is required to prevent flashing from loss of steam supply.

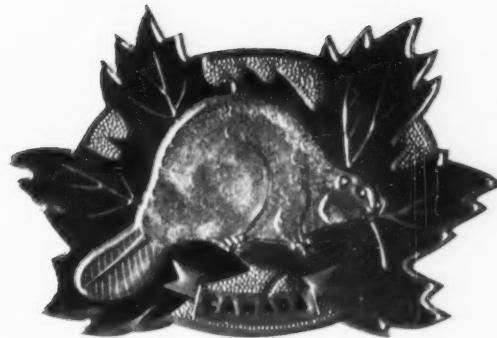
Both calculations are based upon the assumption of 100 F maximum temperature rise in the deaerator. Most bleed cycle installations involve a temperature rise in the deaerator of less than 100 F (usually 40 to 80 F) but it is thought that protection should be available for operation with one or more of the preceding closed heater stages bypassed.

While the utilization of the maximum possible feed pump suction head is always desirable, often it is much less advantageous than supposed. When the elevation of the deaerator over the boiler feed pump is doubled, the volume of the pump suction system also is doubled. On that consideration alone the storage volume required in the deaerator also would be doubled were it not true that the net excess head available for suppressing flashing is somewhat more than doubled.

# Report from

## Canada

MARJORIE ODEN  
Eastern Editor



**THE ASSOCIATION** of Consulting Engineers of Canada, which held the first phase of its annual meeting this month, now has a chapter in the Prairie Provinces. The Association, with offices in Montreal, includes:

• **Montreal Chapter** — with 30 members. This group covers all of Quebec. Because Quebec operates under French civil laws, the Montreal consultants have different government rules and regulations from other parts of the Dominion.

• **Toronto Area Chapter** — covering a circle of about 100 miles around Toronto. This chapter, with 30 members, includes most of the consulting engineers in Ontario.

• **Prairie Chapter** — At an annual meeting in Banff, last year, the Association recognized the prairie group, which includes about 20 members from Alberta, Saskatchewan, and Manitoba. A Prairie Chapter representative is being added to the board. Since the western directors would have disproportionate travel expenses to meetings in eastern Canada, the Association will pay their travel expenses as far as Toronto.

### Membership Requirements

In order to be a member of the Association, a consultant must:

- Be a full member of the Engineering Institute of Canada, the Canadian technical organization.
- Be registered in the province in which his office is located, and belong to The Professional Engineering Corporation of his province.
- Have a high reputation in the engineering field of his choice.
- Have been in independent practice for five years.
- Be at least 35 years of age.
- Have no connection, directly or indirectly, with a contracting organization or with sales.

John H. Ross, who recently completed three terms as a board member, explained that, "We do not feel a man can give impartial engineering advice if he is connected in any way with contracting."

Since Engineering Institute membership is required for all Association members, the Association

holds one part of its annual meeting at the same time and place as the Institute convention. This year, the convention will be May 21 through 23, in Quebec City.

Although the Canadian Association is small as compared to the Consulting Engineers Council in the United States, the Canadian consultants have accomplished many things that are still in the discussion stage in this country. And they are interested in any activity that could broaden their influence as consulting engineers.

"Our Association always is anxious to cooperate with any recognized organization where the combination could assist the consulting engineer," Ross explained. And although the question never has come up for discussion before the board, "we would be certain to entertain an invitation to join the CEC if provincial representation could be arranged. I think this would be a good thing."

The Canadian group, however, would be hesitant to merge with the CEC. "Working together would be preferable," Ross explained. "I have seen other instances where it was advantageous for two groups to retain their identities. We could offer each other objective criticism because neither group would have anything to gain in a regional problem."

"Being much the smaller of the two organizations, we would hesitate to become involved in any way that might result in our being swallowed."

Comparing problems mutually faced by consulting engineers in the two countries, Ross commented that "I'm beginning to feel that the consultant is better understood in Canada than in the U.S."

Admittedly, a lack of knowledge of the consulting profession by the public still is rated as one of the top problems of the Canadian Association. However, the group has recognized the problem for years and taken definite steps to interpret both the profession and the Association.

The Association (in close cooperation with the Professional Engineering Corporations) has prepared and circulated booklets explaining the function of consulting engineers and the Association. Although the names of no individual engineers are mentioned, pictures of projects handled by Associa-

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ation members result in an impressive display of versatility.

If a consultant hears of a prospective project, he can write the Association office and they will send the owner a copy of the booklet telling what a consulting engineer could contribute to the project. These booklets also have been distributed extensively to government agencies on all levels.

In Toronto, as in cities everywhere, many contractors and manufacturers are listed under "Engineers, Consulting" in the telephone book. So, for a number of years the Association has used a box, showing the Association seal and listing its members. The members are not listed elsewhere in the classified section.

In the Association listing, a notation points out that "the following firms have principals who are members of the Association engaged as professional engineers in engineering work independent of salaried employment or sales promotion."

Ross said that when the group first started listing its members separately, many applications for membership were received.

Although operating on a limited budget, the Association does some advertising, listing the names of provincial members or in some instances, all Association members. This advertising is placed in building newspapers or in trade publications, such as the Annual Engineering and Industrial Catalog.

Association members also have been active in compiling and gaining wide acceptance of recommended minimum fee schedules for consulting engineers. A "Tariff of Fees and General Conditions" is circulated by the Consulting Engineers Association. Members have been active also in helping compile two recommended fee booklets for the Association of Professional Engineers of the Province of Ontario. (APEO).

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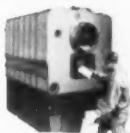
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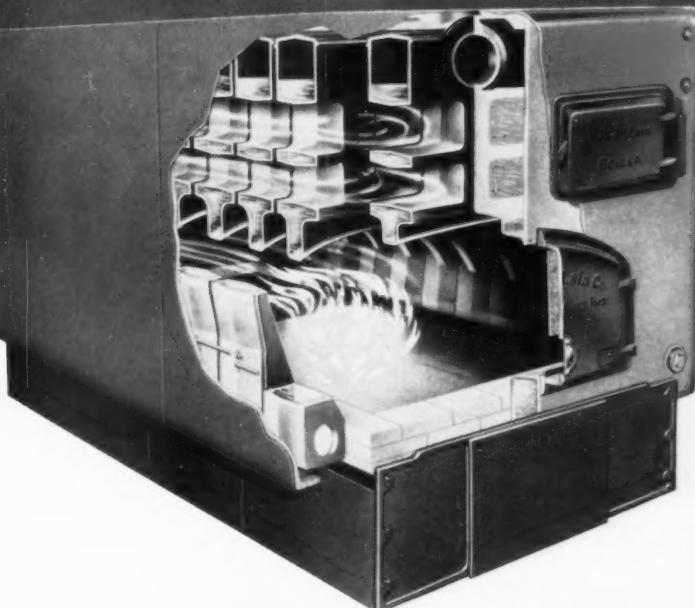
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Engineers, referred to sometimes as Professional Engineering Corporations. These differ from our State and National Societies of Professional Engineers in that they are also the engineering licensing body for the Province.

Ross said the APEO recommended minimum fee schedules and their suggested engineer-client contract have been accepted throughout Canada. Within the past six months the fee schedule has been adopted as law in Quebec. In that province it is now illegal for a client to pay less than the recommended fee or for an engineer to accept less.

#### Still Have Fee Problems

Despite this, all is not at peace on the fee front. Ross said it was only recently that the Association of Professional Engineers was able to get a Federal department of public works to quit using the 1949 recommended fee schedule and convert to a more modern version.

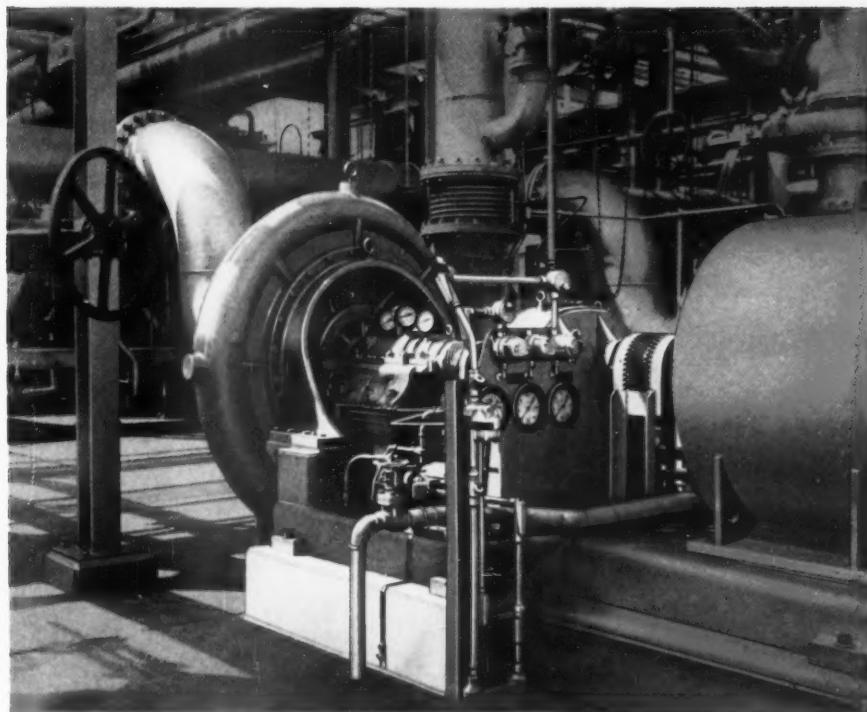
A number of structural engineers also are in the habit of fee cutting, Ross added. He attributed these low fees to "sloppy design, abbreviated drawings, use of nonengineers in an engineering capacity, and the underpayment of professional engineers."

Ross explained that salary surveys are made and suggested minimum salaries computed by the APEO before the fee schedules are compiled. The fee schedules are based on the assumption that minimum recommended salaries are paid.

"We've been lucky. The provincial Associations of Professional Engineers and their governing councils always have shown considerable interest in our private practice problems." Ross theorized that much of the Consulting Engineer Association's past success is due to duplication in the engineering organizations. At the time the fee schedules were prepared by the APEO Consulting Practice Committee most of the committee



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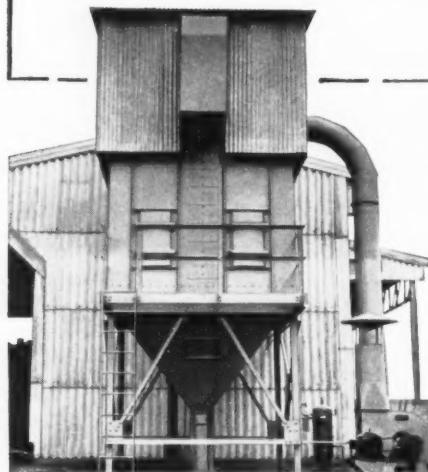
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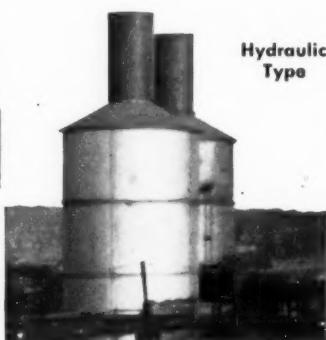
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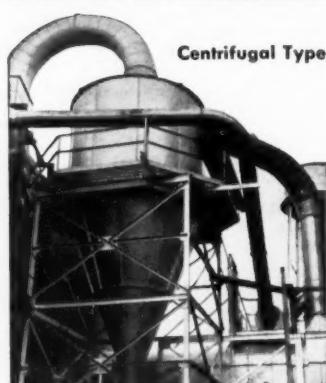


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members also were Consulting Engineer Association members. And when Quebec adopted the fee schedule, Ross was chairman of the Consulting Practices Committee for the Professional Engineers group in Quebec.

Another consulting problem with which the APEO has assisted is an attempt to keep unqualified persons from terming themselves consulting engineers. More than a year ago, they adopted the following definition of a consulting engineer:

"A consulting professional engineer is a member or licensee of this Association [APEO] with at least five years of experience in his field of engineering, who is in a position to provide his client with impartial advice, and who has no direct or indirect concern or interest such as would tend to influence the exercise of independent professional judgment in the matters in which he advises."

Next the Consulting Practice Committee sent copies of this definition to all persons who list themselves with the licensing organization as "consulting engineers." Included with the definition was a request that each "consultant" certify that he is qualified, under the definition, as a consulting engineer.

Now the question is what to do about some of the rather questionable firms who returned the certifications.

The Council of the APEO has the power to expel member (take away their registration), to suspend their membership, or to give them varying degrees of reprimand or censure.

Another problem, pending a solution in Canada as well as in many parts of the United States, is corporate practice.

Ross, whose firm is incorporated, recommended to the Council of the APEO some time ago that all major stockholders and two-thirds of the directors of any consulting engineering corporation should be registered engineers. He told of one firm, founded by



## Aluminum siding selected after engineers compared costs

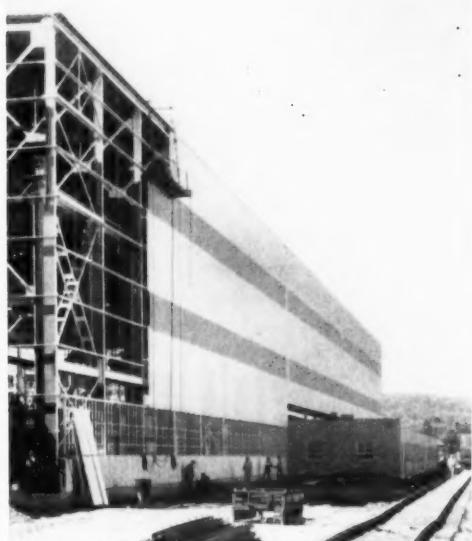
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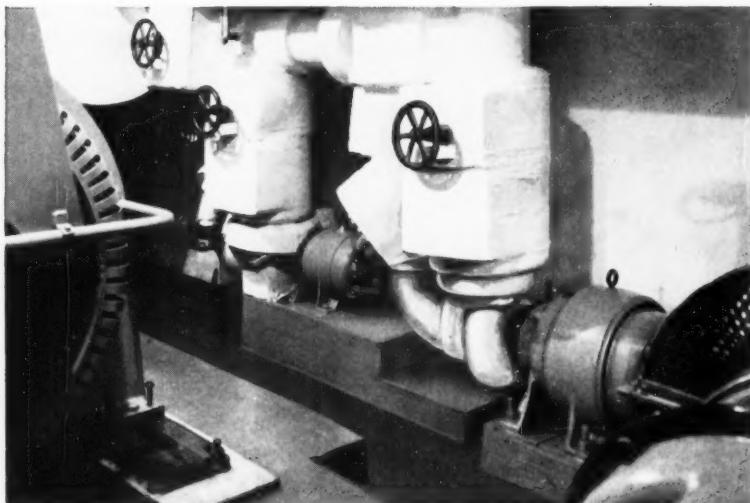


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consulting engineers, which later was purchased by a group of contractors who are not registered engineers. This firm still is operating under the "consulting engineers" title.

This question is to be discussed further by the Professional Engineers Association the next time the Ontario statutes are scheduled for revision.

### Educating the Public

Ross said the top problem still is the education of the public as to the role of the consultant.

"We get calls from some people who seem to think we are plumbers with titles. Others are under the impression that consultants are working for the government and render services free.

"The architects here understand what the consulting engineer offers, but they still do not all use our services."

Ross said "free engineering by manufacturers" still is quite common in Canada, and many architects use these "free" services.

However, the Association of Consulting Engineers has received letters from three leading manufacturers of heating equipment. The manufacturers state they no longer offer free engineering. "Although many manufacturers still offer free engineering, at least we have made them self-conscious enough so that they do not often advertise the fact," he added.

Do Canadian engineers ever use commission agents?

Ross said it is against the APEO Code of Ethics for any engineer to act as, or to use, a commission agent. However, he has heard of a few cases of "questionable public relations counsels," and "I have my suspicions."

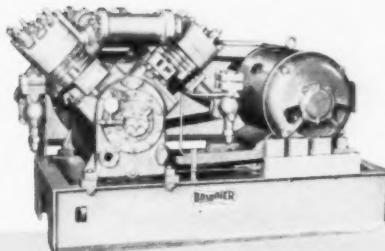
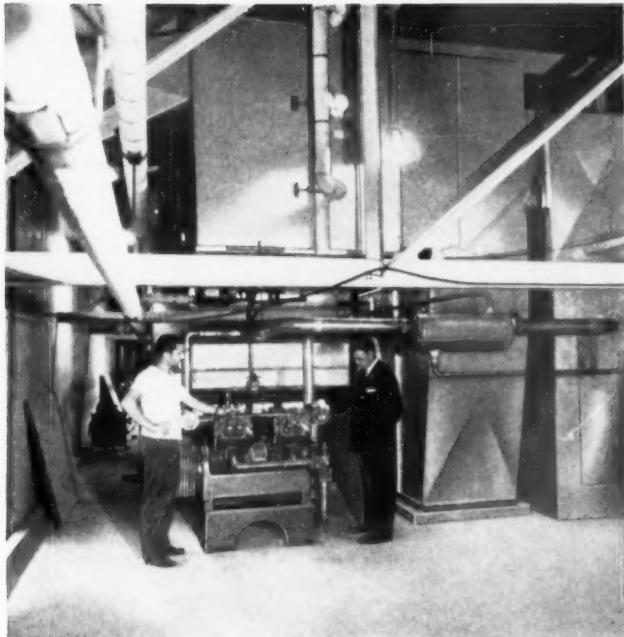
Canadian engineers, as well as U.S. engineers, are eyeing technical and professional organization unity. Although proposals now are in the committee stage, Ross said, "It looks as if something very concrete might develop within the next five years." □□

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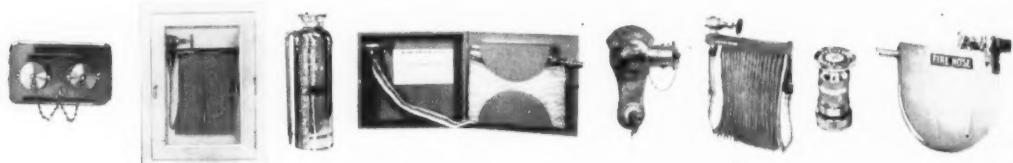
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## Report From The East Coast

### STAFF

Circuit Court judges now can flip a coin, and come up with equal legal precedence for any decision the coin dictates in a wage-hour case involving consulting engineers.

The Fourth Federal Circuit Court, in Norfolk, Va., recently ruled that a Norfolk and Washington, D.C., engineering-architectural firm (Lublin, McGaughy and Associates) is not subject to the Fair Labor Standards Act.

This is in direct contrast with a 1955 decision of the Eighth Circuit Court, which ruled that Brown Engineering Co., of Des Moines, Iowa, was engaging in interstate commerce and thus must be guided by the Federal wage and hour law.

However, on one important point, both circuits agree. A consultant who has employees supervising construction greatly enhances his chances of having to abide by the Fair Labor Standards Act.

Prior to the recent Circuit Court decision in Virginia, courts had disagreed. But these had been lower courts, and the recent Virginia decision marks the first time circuit judges have stood in direct opposition on this question.

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### Three Basic Questions

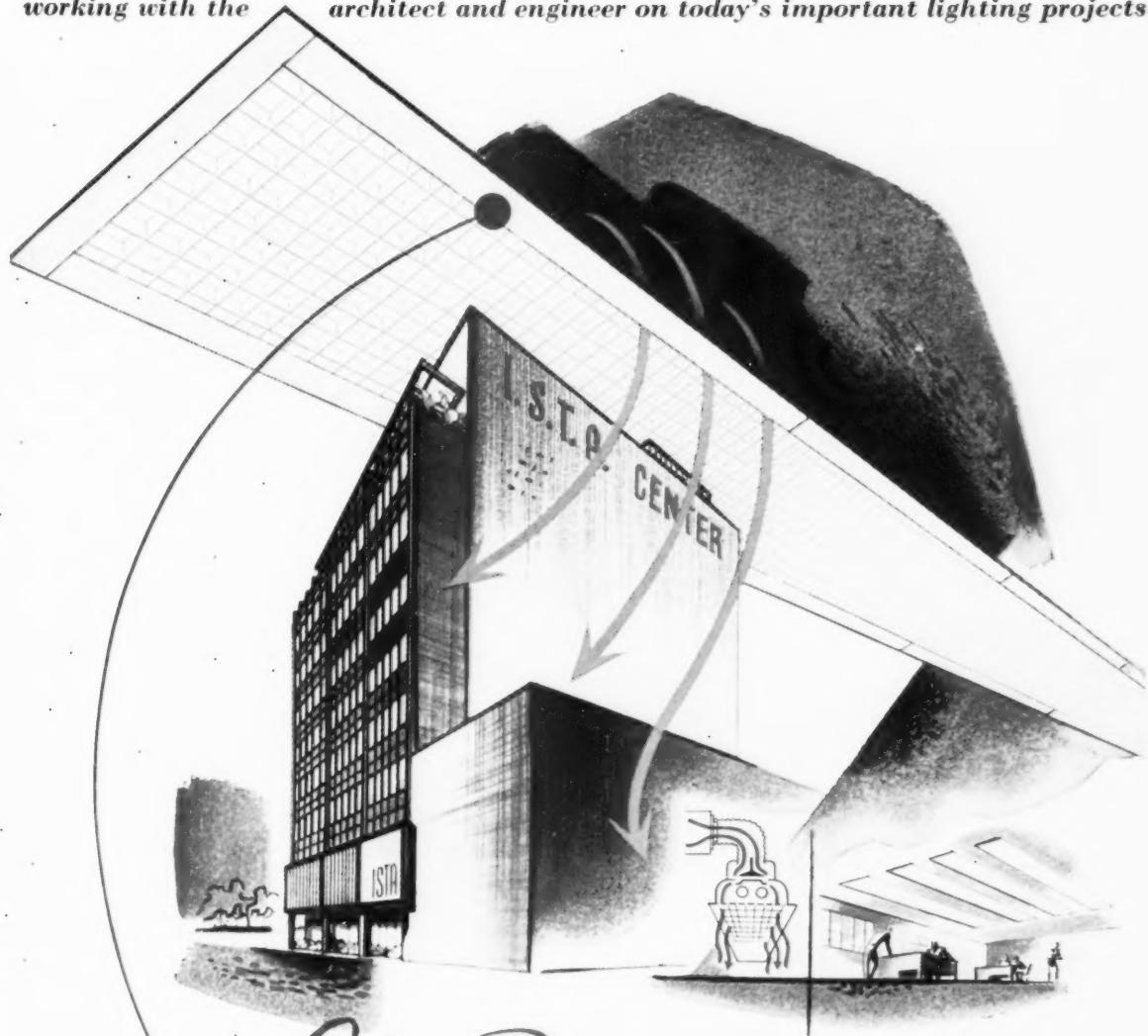
As Lunch pointed out, the recent Norfolk case centers on three basic questions that have been argued with varying results in lower courts all over the nation:

- ¶ Is the shipment of blueprints and other drawings the shipment of "goods"?
- ¶ Is the consulting engineering firm actively engaging in interstate commerce?
- ¶ What is the firm's relation to the client's chain of interstate commerce operations?

The Norfolk case contained all three arguments, with the judge sounding in his decision as if he is one of those rare legal beings who understands what a consulting engineer is.

The Labor Department contended, before launching into the traditional arguments, that the Norfolk and Washington firm "employed many persons in interstate commerce and in the production of goods for interstate commerce for work weeks longer than 40 hours without compensating them for excess

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## Report From The East Coast

### STAFF

Circuit Court judges now can flip a coin, and come up with equal legal precedence for any decision the coin dictates in a wage-hour case involving consulting engineers.

The Fourth Federal Circuit Court, in Norfolk, Va., recently ruled that a Norfolk and Washington, D.C., engineering-architectural firm (Lublin, McGaughy and Associates) is not subject to the Fair Labor Standards Act.

This is in direct contrast with a 1955 decision of the Eighth Circuit Court, which ruled that Brown Engineering Co., of Des Moines, Iowa, was engaging in interstate commerce and thus must be guided by the Federal wage and hour law.

However, on one important point, both circuits agree. A consultant who has employees supervising construction greatly enhances his chances of having to abide by the Fair Labor Standards Act.

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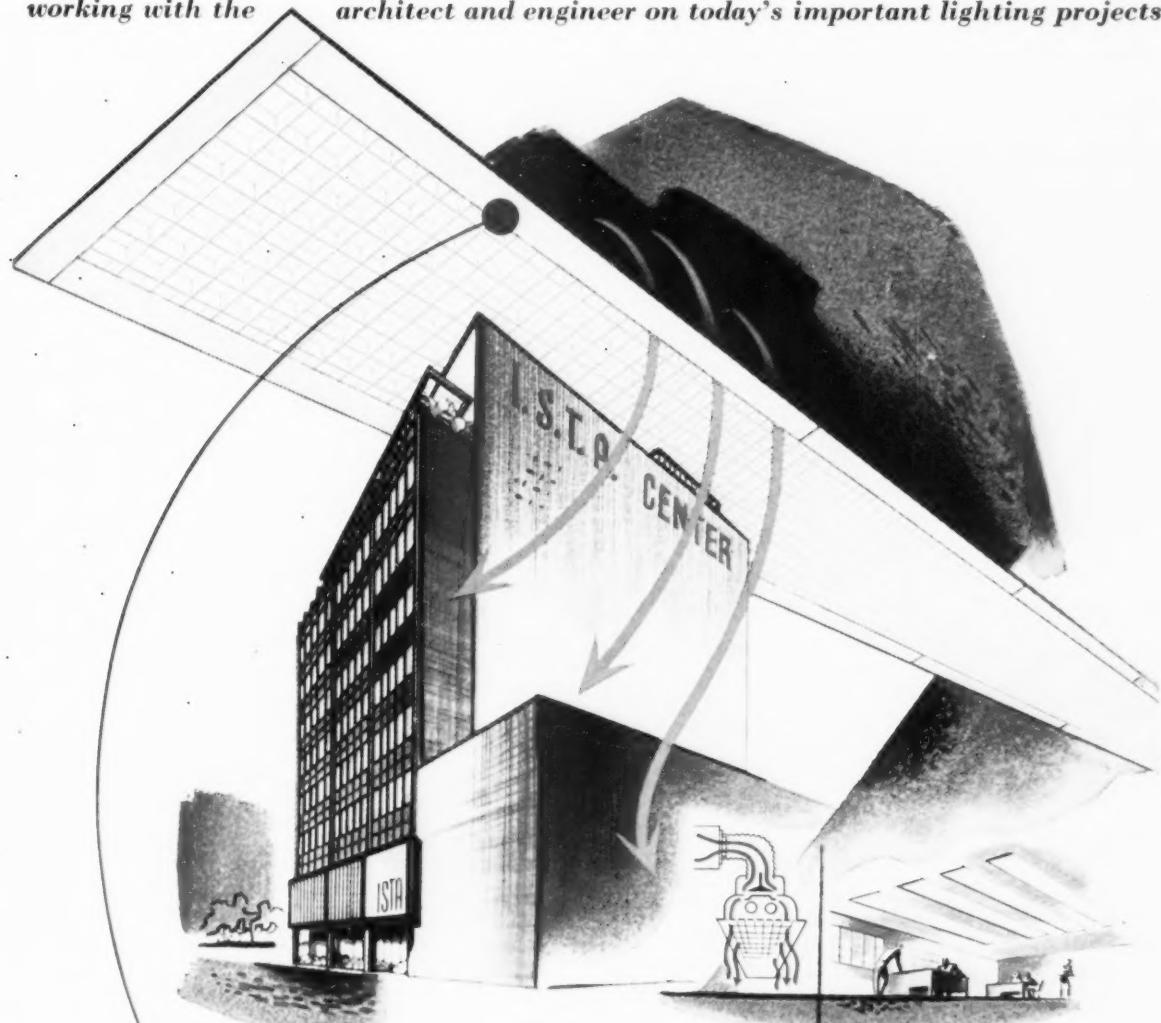
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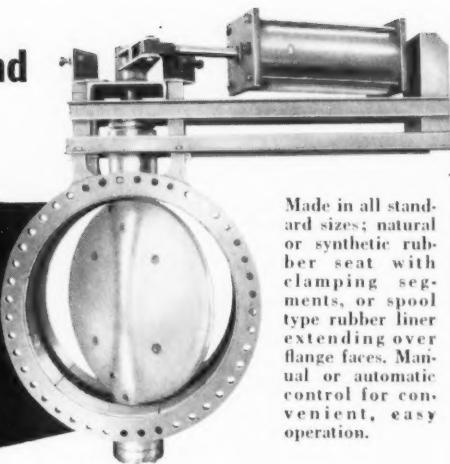
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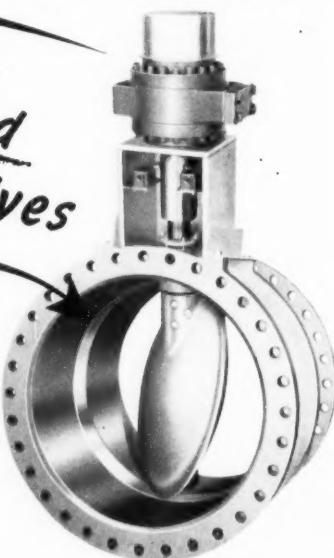
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hours at rates of not less than one and one-half times their regular rates. Also that they failed to keep adequate records of employees wages and hours."

The Labor Department states, in its brief, that the Norfolk and Washington firm transmits many drawings, plus explanatory specifications across state lines.

The judge agreed.

But he pointed out that the engineer-architect firm was "not employed to manufacture documents to be sold or transported in interstate commerce but to give professional advice and assistance which of necessity was given permanent form as plans or specifications so as to be available for guidance and reference."

"Clearly such plans were not 'goods' in the ordinary case . . ." And "the mere fact that the documents crossed state lines did not alter their inherent value."

On the second argument, the Labor Department had some very "convincing" proof that the firm engaged in interstate commerce. For instance, some persons took telephone messages, even calls from out-of-state. And "stenographers typed letters, mailed to points out of the state."

The Labor Department also reported that one survey party, reporting daily to the Washington office, works in Maryland.

This is in addition to persons who transport drawings and blueprints from one state to another.

The judge said "the mere use of the mails and transportation facilities across state lines is not necessarily interstate commerce. There must be some relation to a business which in interstate in character."

He added that "where the business is essentially local and there is no production of goods, communication which is merely incidental to the local enterprise cannot be classified as commerce."

"The interoffice communication in this case related to the local production of plans and specifications, and the fieldmen who trav-



*Buell Precipitator at mid-western cement plant.*

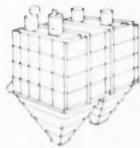
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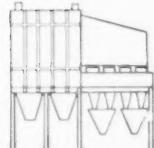
Write Dept. 47-B, Buell Engineering Company, Inc., 123 William Street, New York 38, New York.



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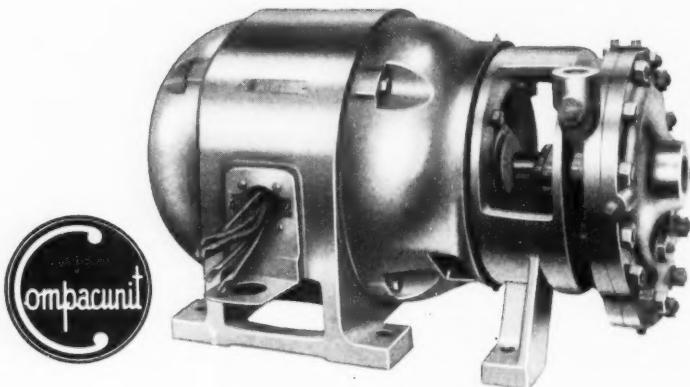


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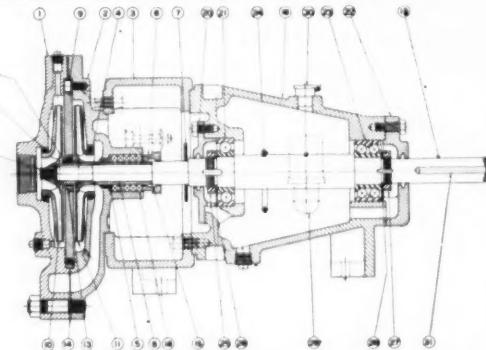
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2. Casing—2nd Stage
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6. Gland
7. Flinger
8. Shaft Sleeve
9. Center Section
10. Impeller—1st Stage
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| Gland         | Cast Iron | Cast Iron       | Bronze     |
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eled from state to state were sent out to get the information as to the character of the work to be done, so that the architect and engineer might do their preparatory work. All of these activities related to the production of plans, partook of their intrastate character, and cannot be fairly characterized as commerce between states."

On the third argument, the Labor Department attempted again to establish the firm in the interstate chain.

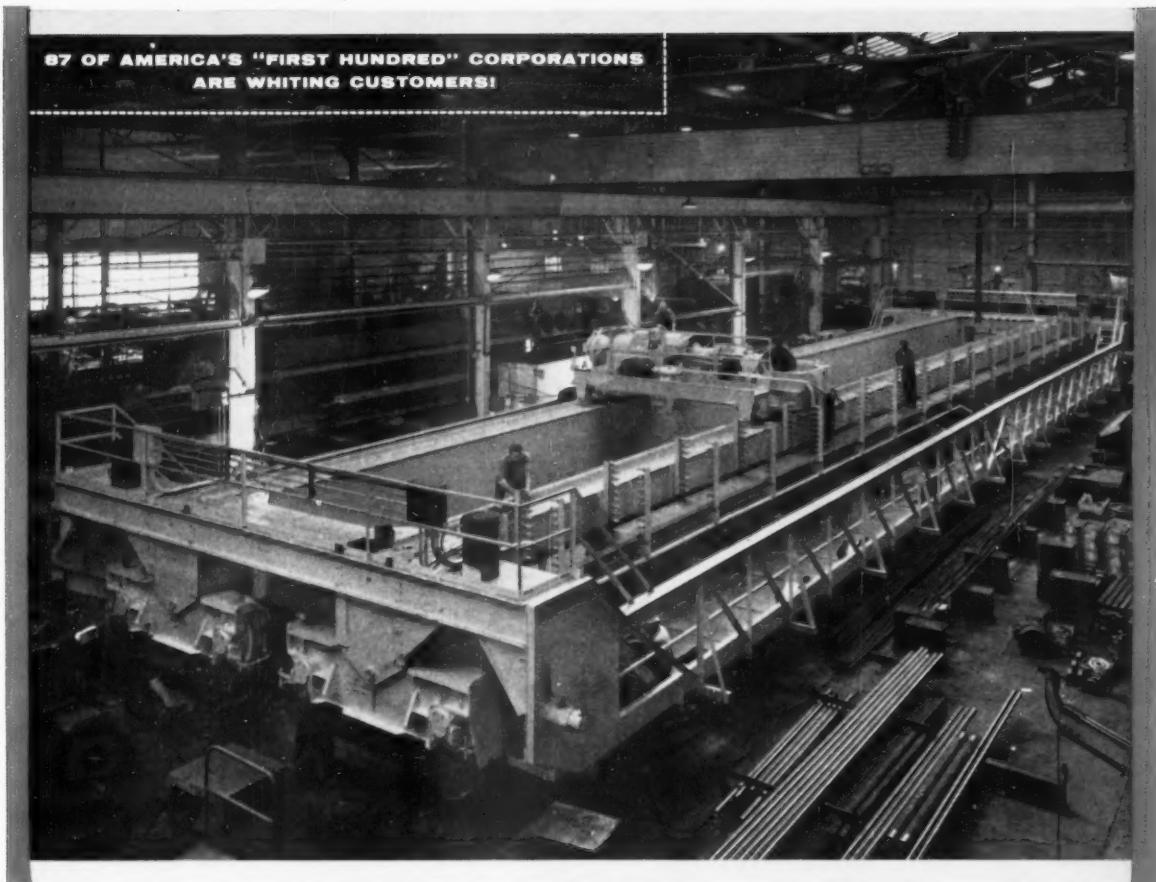
"Projects for the improvement or repair of interstate instrumentalities on which the defendants have worked include airfields and airplane facilities for which streets are widened or constructed, hangars are repaired or altered, and extensions are built. Radio and television facilities are relocated, repairs to government buildings at shipyards and machine shops are made, and other work in Maryland, Virginia, and North Carolina is constructed."

(The Brown case, in Iowa, was considered interstate commerce partially because Brown participated in planning the paving of streets. In the Singstad & Baillie case, they are said to be engaged in interstate commerce because they designed the Baltimore harbor tunnel, connecting interstate highways).

The Fourth Circuit judge compared the Lublin-McGaughey case to an earlier contention that persons running an office building were engaged in interstate commerce because some of the offices were rented to manufacturing enterprises. Here the judge ruled against connecting building personnel to interstate commerce, stating that "our problem is not an exercise in scholastic logic."

The Virginia circuit court pointed out that the engineer-architect works for a number of clients, some local in nature, while others are such that even construction workers are covered by the Act.

"But the architectural work itself was local and of necessity



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gave color to activities of their subordinates and took them outside the scope of the statute."

The judge cautioned, however, that "this is not to say that some employees of the firm may not have participated so actively at the site of construction as to be covered; and nothing in this decision is intended to preclude further proceedings as to them."

#### Supervision a Factor

Lunch pointed out that this closing paragraph in the Virginia case is going to be a big factor in any future questions of wage-hour cases involving consultants.

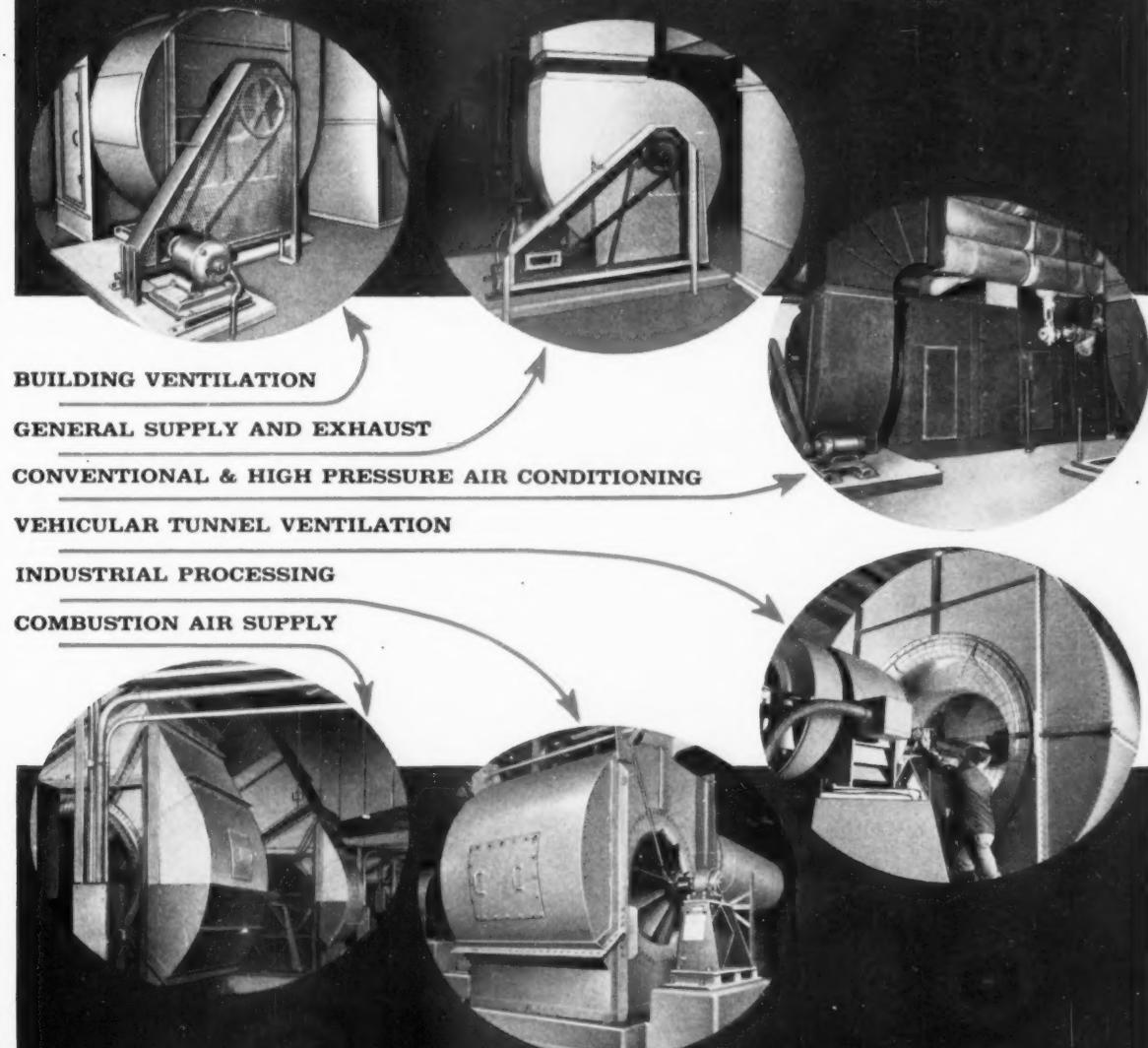
The Iowa Circuit Court decision was very explicit in saying that the "resident engineer" was a vital factor affecting the progress of the construction project. And in announcing his decision, the judge again mentioned the resident engineer—"So here, the defendant's employees' preparation of plans and specifications for the repair and improvement of existing instrumentalities of commerce together with activities of the 'resident engineer' at the actual job site, were sufficient to bring them within the coverage of the 'in commerce' phase of the Fair Labor Standards Act."

The importance of the project engineer, directly referred to in the Brown case, also was given "implied" importance in the Norfolk case, Lunch added.

In the 1955 appeal to the Supreme Court, the NSPE pointed out that the definition of "goods" by governments is not a new problem, but dates back to at least the sixteenth century. The brief quoted W. Somerset Maugham's essay, "El Greco:"

"When the authorities taxed him upon the profits of his work at Illescas, he fought them and got judgment in his favour. So far as I can understand the argument, his contention was that what he sold was not canvas and paint, but the art with which he had arranged the paint, and this was not dutiable." ▲▲

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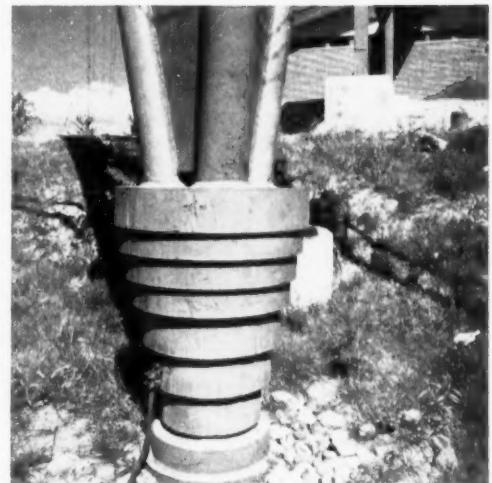
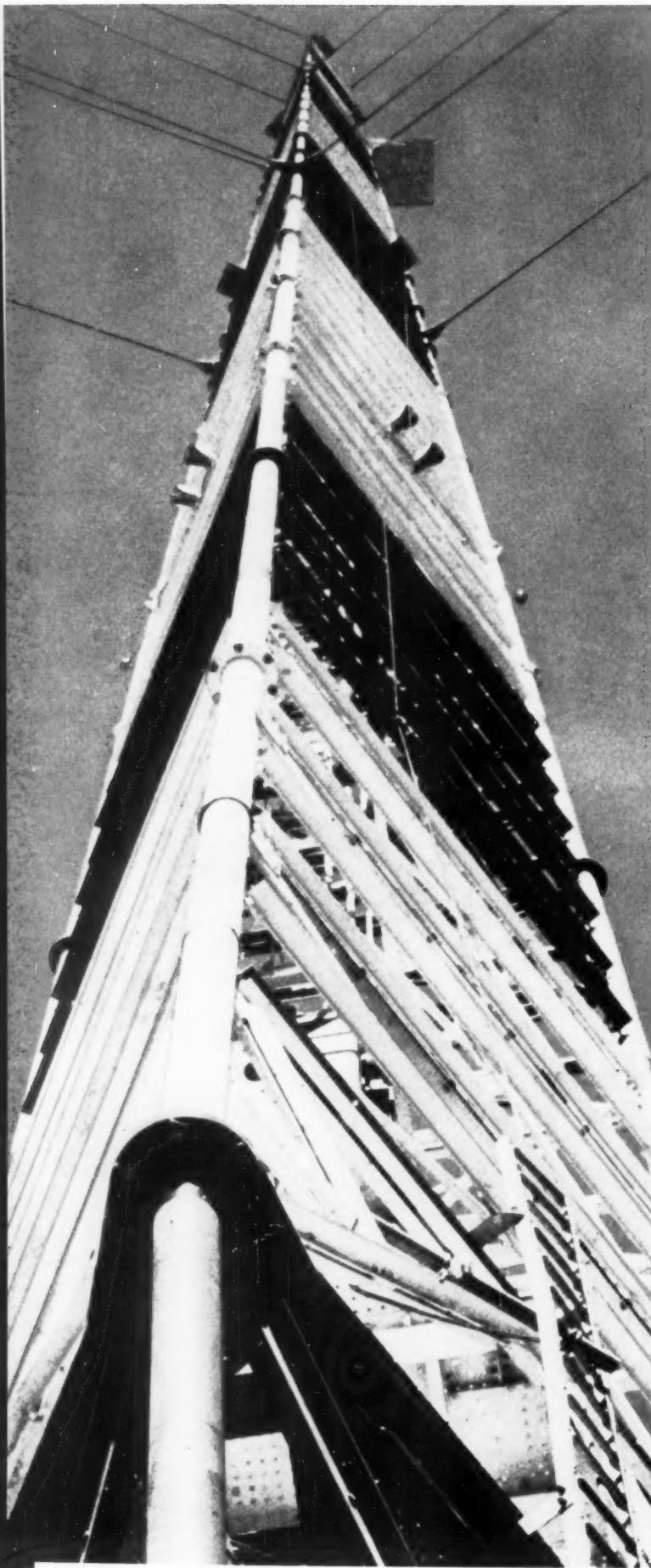
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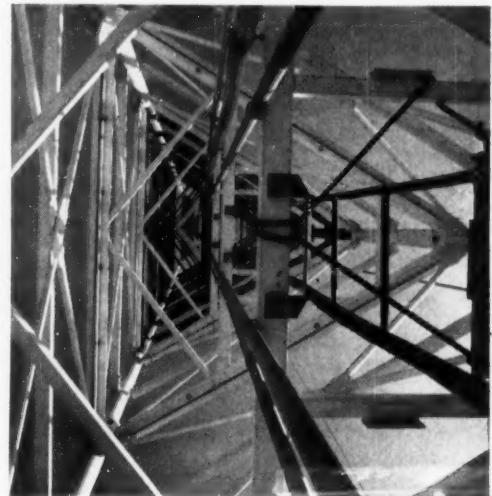
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Round, hot-rolled, heat-treated bars of USS "T-1" Steel were used for the three legs up to the 838-ft. height because this alloy steel has nearly three times the yield strength of structural carbon steel. It therefore enabled Dresser-Ideco to reduce

the size of the legs greatly, lowering shipping weight, welding costs, wind stresses and over-all weight and price. For example, consider the leg members at the bottom of the tower. Cross-sectional area of these "T-1" bars is only 56% of the area required with the usual structural carbon steel, resulting in a 44% material savings. Also saved: the cost of hot forging and machining, since carbon bars of the size required for the biggest members are too large to be produced economically by hot-rolling. Altogether, the builders estimate that "T-1" Steel cut the cost of this tower by 15%.

For more information on USS "T-1" Constructional Alloy Steel, contact any office of United States Steel (listed in all phone directories), or write United States Steel, 525 William Penn Place, Pittsburgh 30, Pa. For details about the column strength of "T-1", write us for our booklet on the subject.

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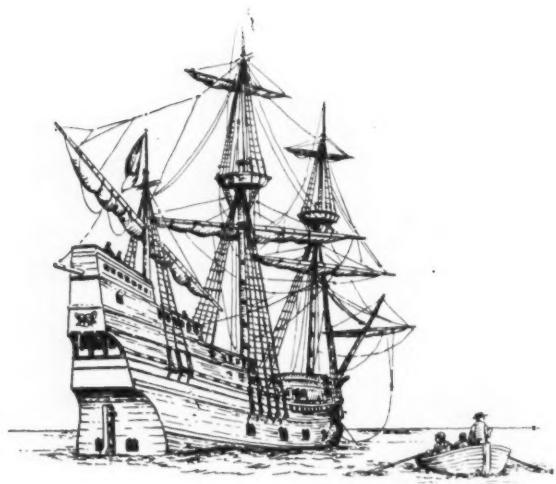
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# Beyond Our Borders

... and behind the Iron Curtain

## Hydro Development in the USSR

There are over 100,000 rivers in the USSR and their potential hydroelectric capacity is estimated at 3700-billion kwh. The construction of power stations in the USSR has been treated as a matter of urgency since the last war, and it is claimed that the number of hydro stations in the USSR now runs into hundreds. A further 1800 are planned in addition to some 20,000 small-capacity hydro stations for the farming areas.

The oldest large hydroelectric power scheme in the Soviet Union is that based on the Dnieper. The government now plans to expand it by building 15 hydro power stations, which will use practically the entire energy of the river, estimated at 14.5-billion kw a year. The construction of the new hydro plants also should increase the power production at the old stations for the Dnieper is very uneven and the brief spring floods account for about three-quarters of its annual discharge. On some days in summer its flow is only a hundredth of what it is in spring. For example, the Dnieper power station has a maximum generating capacity of 650,000 kw but the guaranteed capacity is just over one-fifth of that — 150,000 kw — because the station has only a small reservoir. Bigger reservoirs however, would flood land that otherwise could be used for farming. To solve this problem it is planned to create big reservoirs in the middle and lower reaches of the Dnieper where losses from flooding will be more than balanced by using the water to irrigate arid land and to meet the water needs of industry.

In addition to the Dnieper power station, another hydroelectric station on the Dnieper — the Kakhovka station with a capacity of 312,000 kw — is now in operation. Work also is going ahead on two other big stations, one at Dneprodzerzhinsk and the other at Kremenchug. Their total generating capacity will be 800,000 kw. Both stations are to be put into op-

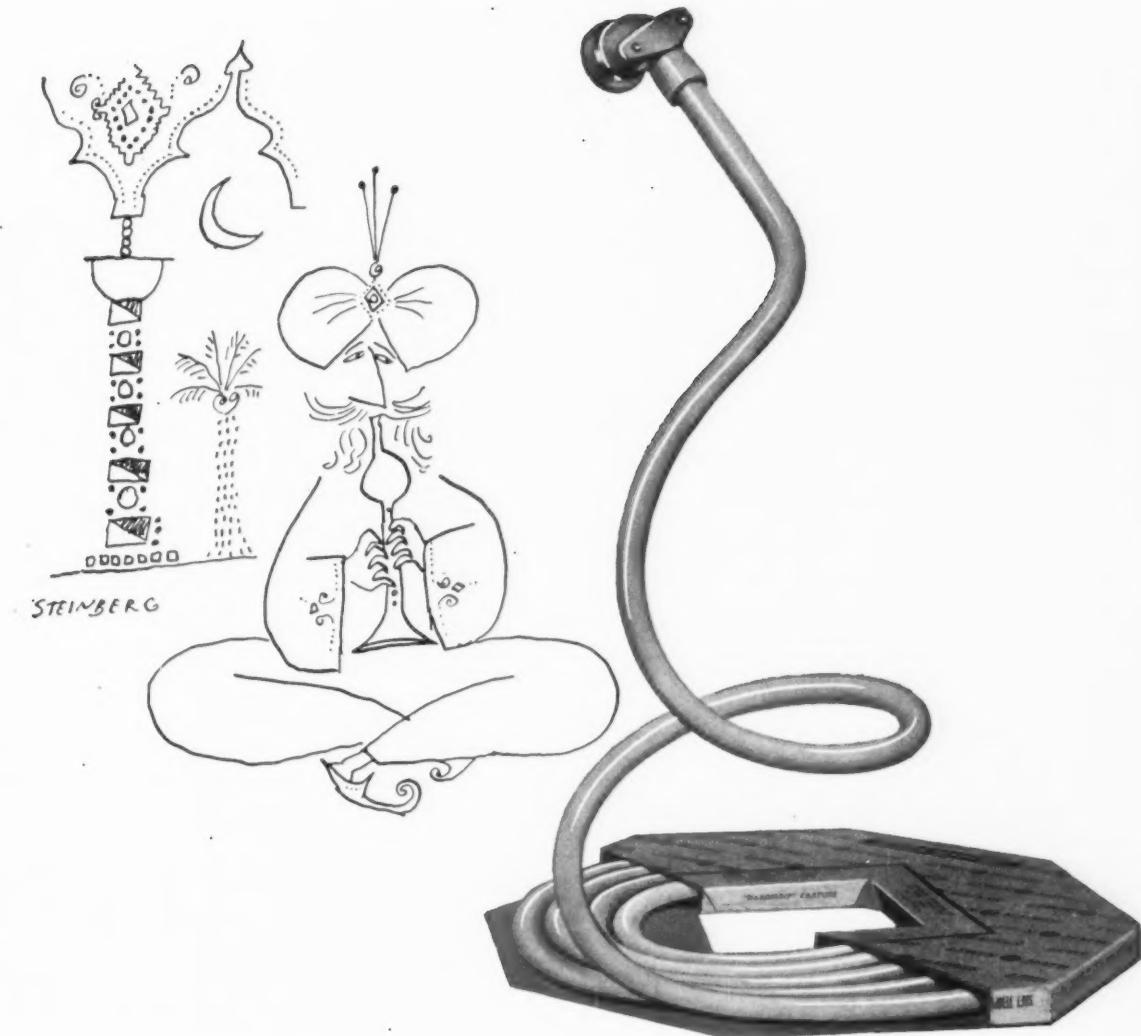
eration during the current Five Year Plan — by the end of 1960. Then more than half of the power potential of the Dnieper will be harnessed. During this Five Year Plan, work is also to begin on the fifth station of the series, at Kanev.

Plans are being made in Belorussia to build the largest hydroelectric station in that country — in Vitebsk. A high dam will considerably raise the level of the Western Dvina and form a lake covering an area of over 300 square miles. The waters of the Vitebsk reservoir not only will set in motion the turbines of the Vitebsk power station but also will feed the Kegum power station already in operation on the Western Dvina and the Plyavin hydro power station now under construction in Latvia. Thus, a chain of power stations will be created on the Dvina to further industrial development in Belorussia and the Baltic area and improving navigation on the smaller rivers.

According to Soviet sources, the chain of hydro power stations now under construction on the Volga — the largest river in Europe — will surpass the power of all the hydroelectric stations of the Tennessee Valley. Five Volga hydro power stations are already in service. They include the Kuibyshev hydro power station, which this year is to reach its planned capacity of 2.1-million kw and is to supply the country with 11.4-billion kwh per year.

The construction of the Stalingrad hydro power station, which is to be even larger than the Kuibyshev station is in full swing. The seventh link in the Volga chain of power stations is the Saratov power station with a capacity of 1-million kw, which is now being built. During the current Five Year Plan the building of the eighth Volga power station, the Cherkassy with a capacity of 800,000 kw, is to begin.

Volga power stations are of particular importance for Moscow. In 1957, the Kuibyshev station will



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Like the ancient coppersmith, our pride of product is that of the *integrated specialist*. And the Lewin-Mathes nation-wide supply facilities serving you, we believe, are second to none.

discipline

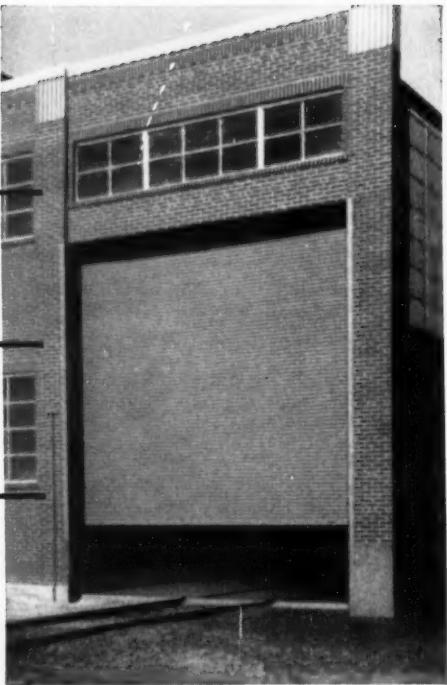
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You get more protection plus more efficiency in Kinnear Rolling Doors. Coiling above the doorway, they open out of the way! They never block light from close-by windows or fixtures. No floor, wall, or ceiling space is sacrificed. Hoists, conveyors, high-lift fork trucks and similar equipment can be used to maximum advantage.

1. Details on every Kinnear door are REGISTERED—kept in fire-safe vaults. Damaged or worn parts are permanently replaceable. Your Kinnear Door is never "orphaned."

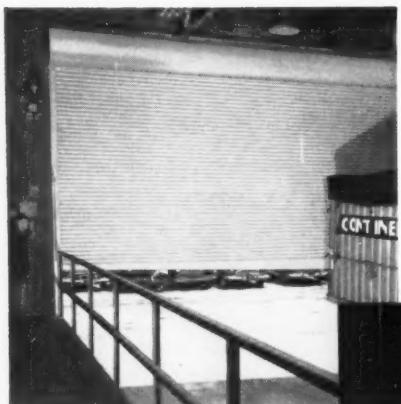
2. Kinnear's rugged interlocking-slat curtain is heavily galvanized (1.25 ounces of pure zinc per sq. ft., A.S.T.M. Standards). In addition, the special Kinnear Paint Bond assures immediate, thorough coverage and adhesion of field-applied paint.

Kinnear Rolling Doors are engineered to fit any need, with manual-lift, crank, chain or electrical operation. Controls for motorized doors can be placed at any number of convenient spots. For long, low-cost service, insist on Kinnear Rolling Doors! Write for catalog.

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ROLLING DOORS  
*Saving Ways in Doorways*



supply Moscow with 7-billion kwh of electricity. Power to the capital is supplied also by the Gorky, Ivankovo, Uglich, and Shcherbakov power stations.

It is claimed by Soviet sources that Volga hydro power is eight times cheaper than that produced by thermal power stations, and that it would be necessary to use 10,000 trainloads of coal annually if the same amount of power was produced at thermal stations.

In Central Asia the construction of hydro power stations is said to be progressing rapidly. These projects are being tied in with irrigation schemes, so important for the agriculture of those areas.

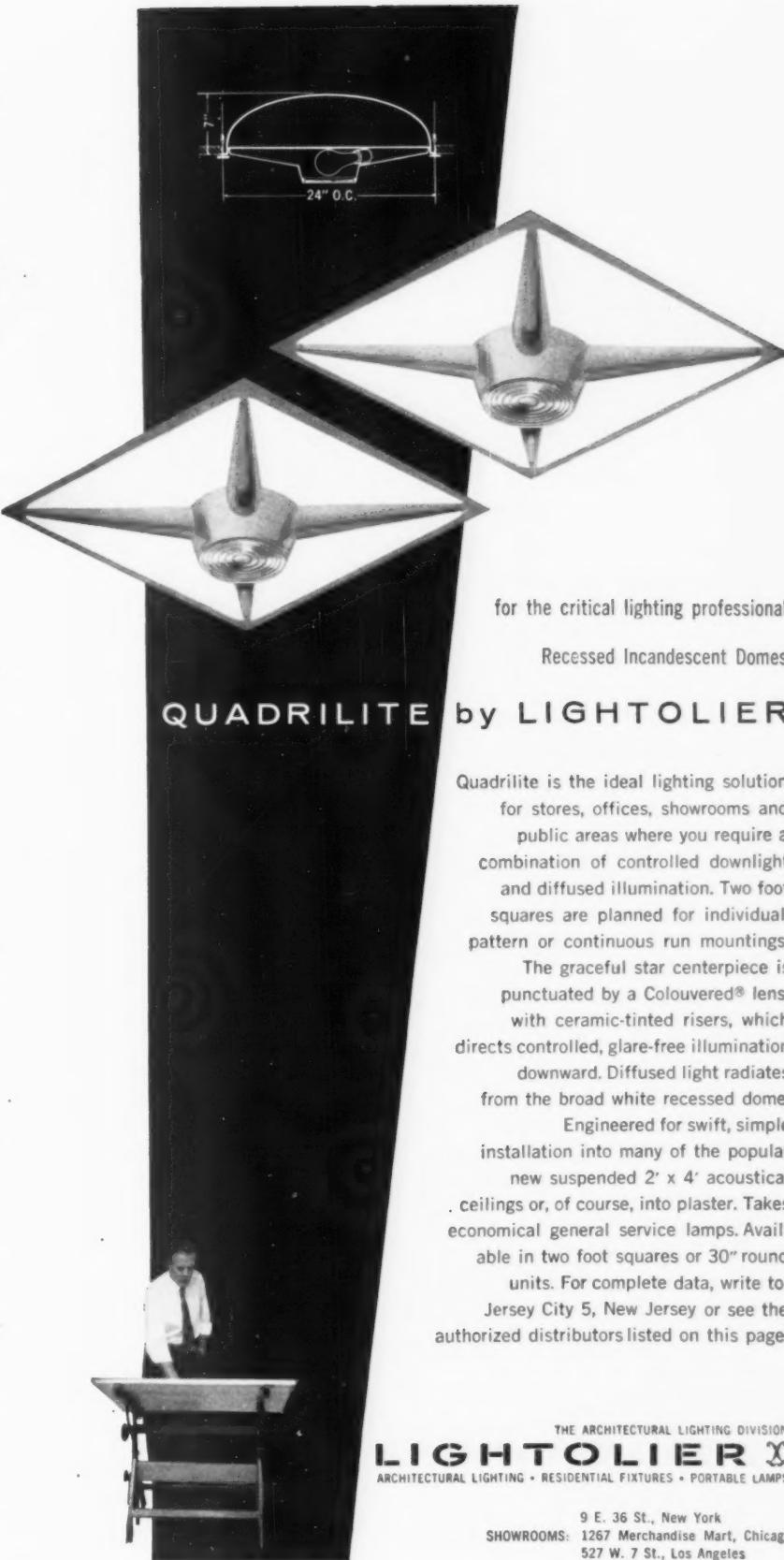
In Kirghizia plans are being made to build a chain of hydro power stations on the River Naryn which takes its water from high altitude glaciers and cuts its way through mountainous regions. These stations are to supply electricity to several Republics of Central Asia and to Kazakhstan. It is expected that they also will provide a source of industrial power for the exploitation of newly discovered coal and ores in central Tyan Shan.

In Dagestan work is going ahead on the construction of the Chir Yurt hydro power station on the River Sulak. A 130-ft dam is being erected on the river to create a water reservoir with 1-billion cu ft capacity from which a 2-mile, concrete-covered canal is to supply water to the power station. The station will supply electricity to the capital of this North Caucasian Republic and will provide the basis for an irrigation scheme. After this, it is proposed that another be built on the same river—the Chirkeyevskaya hydro power station—which is to have a 750-ft dam, one of the highest in the USSR.

The Kairak-Kum hydro power station—the largest in Central Asia—will start work at full capacity in 1957, generating a total of 120,000 kw. It is situated in the middle reaches of the Syrdarya.

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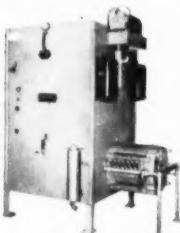
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in the vicinity of Leninabad. This hydro power project is designed to solve two problems—to increase electric supply in Tajikistan and Uzbekistan and to provide more water for agriculture in these areas and in Kazakhstan. The reservoir of this station will make possible the irrigation of 1-million acres. It also will control the flow of the Syrdaya and thus help to increase the output of electric power at the Ferhad hydro power station situated on the lower reaches of the same river.

In Armenia favorable conditions for hydro power development exist in the area of the Sevan Lake. Thirty rivers enter this lake but only one river—the Razdan—leaves it.

A total of eight hydro power stations along the Razdan eventually will form the Sevano-Razdansky Cascade. Four of these stations have been built and a fifth is under construction. Blueprints are ready for the sixth unit of the scheme, and the planning of the last two has reached final stages. One of the stations is built underground and another has been sunk in the rock.

The rivers in Siberia and the far East—Enisei, Angara, Lena, Amur—have hydro power potential estimated at 1.7-billion kwh per year, which considerably exceeds the hydro potential of the United States, Canada, and Europe. About one-half of all USSR power resources are concentrated there. The first power station in the Angara Cascade, the Irkutsk hydro power station, was put into operation in 1956. Its capacity is 660,000 kw. The construction of the 3.2-million kw Bratsk hydro power station is in progress. On the River Enisei a power station with a planned capacity recently raised to 3.6-million kw is being built near Krasnoyarsk. Its construction will raise the level of the Enisei by over 330 feet. The station will be equipped with 14 generators of 258,000 kw each, and the annual power output of the station is to



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amount to 19-billion kwh, at a cost of about 3 mills per kwh.

Another hydro power station is being built in Novosibirsk. Altogether, the Enisei power stations will have a capacity of 20-million kw.

In spite of the large-scale construction of hydro power stations, thermal power stations will account for 80 percent of all power generated in the USSR during the sixth Five Year Plan. The South Urals thermal power station is one of the first Soviet thermal power stations with a capacity exceeding 1-million kw. Soviet engineers are continuing their work on ways to utilize local fuel reserves and already have evolved methods of burning about 60 varieties of fuel including those of the lowest grade. Coal with an ash content of up to 30 percent and moisture of up to 37 percent is used at the Cherepets station with its 150,000-kw generators. Anthracite dust, previously wasted, now serves as fuel in the Donbas. More than half of the generating sets installed during the present Five Year Plan will have capacities of 100,000, 150,000, or 200,000 kw. The efficiency of steam boilers will be doubled or trebled and high pressure steam at 1900-3200 psi will be used on a wider scale. A 300,000-kw turbine block designed for a steam pressure of up to 4400 psi at a temperature of 1202 F will be installed at a power station before the end of 1960.

To save coal, several power stations in the USSR are being converted to natural gas, which will be used this year to fire the Pridneprovskaya and the Voroshilovsk thermal power stations in Dneprodzerzhinsk and Donbas, the Stalingrad thermal power stations, and several others. At the moment 12 percent of all power generation in the south of the USSR comes from gas-fuel power stations, and this figure will go up to 30 percent by the end of 1960.

A few months ago, it was re-

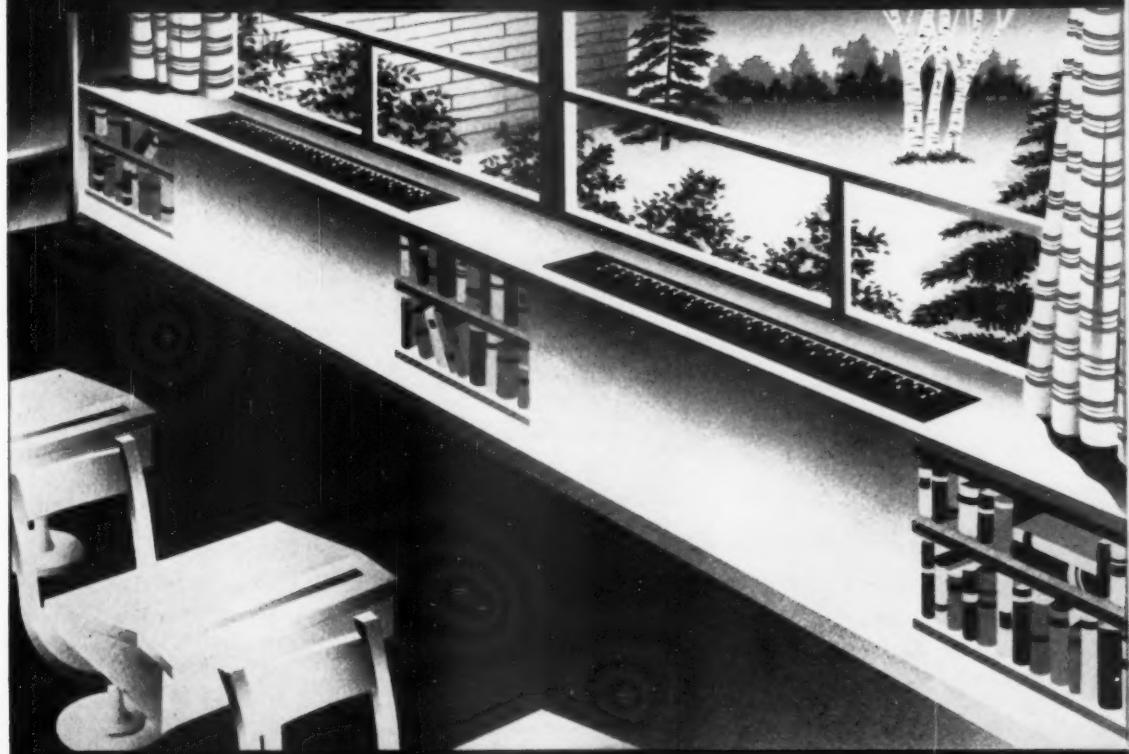
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*Tom*

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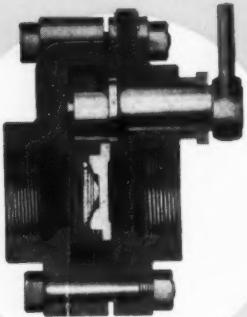
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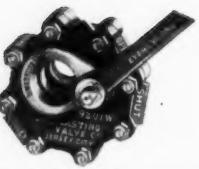
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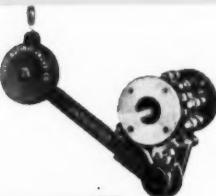
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ported that the blueprints of the Baltic thermal power station have been completed. It is to be the first station in the USSR to supply, on a commercial basis, electric power produced with high pressure steam. Tests conducted for this design involve pressure of up to 1470 psi and temperature of 1000 F. The power station will work on shale fuel. It is claimed that for the first time in the practice of thermal power stations special boilers heated by shale furnaces will produce 220 tons of steam per hour. The main building of the station will be 650-ft long. It has been designed with the benefit of experience gained in the construction of the Kirov thermal power station, which started operation in Leningrad in 1956. The power station will produce 1-million tons of shale ashes as refuse, and it is proposed that an industrial plant be built alongside to use the ashes in the production of building materials.

In Uzbekistan work is under way on the construction of big thermal power stations in Takhia-Tash, Fergana, and Angren. The latter is of particular interest as it will work on gas obtained through underground combustion of coal.

In the far East an expedition of the USSR Academy of Sciences recently has examined hot springs and the escape of hot vapors in the South of Kamchatka where it is planned to erect an experimental geo-thermal electric power station with a view to the possible exploitation of the earth's thermal energy. It was found that water on the surface had a temperature of up to 212 F, and it is believed that at a depth of 1600 feet its temperature and pressure are much higher.

## **Water Level Falling**

The falling level of the Caspian sea is a serious headache to the Soviet authorities. The sea supports some 40 fishing enterprises processing fish. It supplies 90 percent of the world sturgeon;

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pectancy of many boilers, the fuel bill can amount to several million dollars. Unless it is well engineered, serviced, and maintained, a boiler's efficiency can drop off 2 or 3 per cent or even more. This amounts to a substantial sum of money.

**You Save on Your Steam Supply** with a B&W Boiler. It pays to buy the best

—top level engineering, long range sustained economy, and best performance. A national network of plants and engineers, supported by nearly a century of steam generating experience, is yours with B&W.

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BOILER  
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MODERN STEAM MAKES YOUR PRODUCT BETTER AT LOWER COST

# Sier-Bath SCREW PUMPS

installed at

COLORADO SPRINGS POWER PLANT

for overall design,  
economy and safety

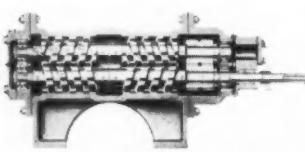


• In 1952, this 55,000 Kilowatt Municipal Steam plant at Colorado Springs, Colorado installed two Sier-Bath external gear and bearing type screw pumps for intermittent standby fuel oil service. Fuel oil has a viscosity of 150 SSU at 100°F. No maintenance has been required to date.

## Sier-Bath SCREW PUMPS



External Gear and Bearing Bracket Type for non-lubricating liquids and semi-liquids



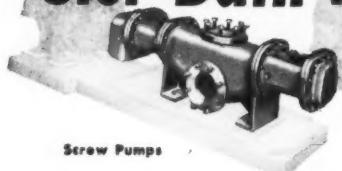
Internal Gear and Bearing Type for lubricating liquids and semi-liquids

**Sier-Bath Screw Pumps** maintain high volumetric efficiency because "Dual-Controlled" precision rotor design prevents rotor-to-rotor or rotor-to-casing contact—provides a continuous flow without pulsation, hammering or vibration... without strains, misalignment and wear on rotors, shafts, bearings and gears.

**Result:** Dependable, uninterrupted pumping service—less downtime—less maintenance—easier servicing—longer pump life—lower overall pumping costs.

Capacities from 1 to 1,000 gpm.; viscosities from 32 SSU to 1,000,000 SSU.; discharge to 1,000 psi. for viscous liquids, 200 psi. for water and light oils. Horizontal or vertical construction. Corrosion resistant alloys, special bodies, stuffing boxes and bearings for special needs. Call your Sier-Bath representative or write Sier-Bath Gear & Pump Co., Inc., 9257 Hudson Blvd., North Bergen, N. J.

## Sier-Bath ROTARY PUMPS



Screw Pumps



Gearbox® Pumps



Hydrox® Pumps

Member A.S.M.E.

50th Anniversary

Mfrs. of Precision Gears, Rotary Pumps, Flexible Gear Couplings

there is oil under its bed, and inexhaustible deposits of silicate salts. Goods transportation over the Caspian equals nearly 40 percent of all sea-borne traffic of the USSR, and the ports of Baku and Astrakhan have the highest turnover in the country.

The drop in the water level has been noticeable for some 25 years. In some places the shore line has receded as much as 60 kilometers (37 miles) causing dislocation in several important industries, in agriculture, and in the fishing economy of the Caspian basin, mostly in the northern areas. Between 1929 and 1936 the total catches of fish declined by 22 percent and herring catches by over 43 percent. Similar dislocations have been caused in the sea-borne traffic, which in some places cannot reach its destination.

Last September a conference was called by the USSR Academy of Sciences in Astrakhan to discuss these problems. Over 200 scientists, engineers, and ministerial representatives attended. The conference estimated that the level of the sea will be one to two meters lower by 1970. It was established that the restoration and maintenance of the normal water level is possible only by diverting large quantities of water from other basins. During the last 25 years many proposals have been made for transferring water from the Don, Dneper, Amu-Darya, and other rivers to the Caspian. Closer examination proved, however, that these proposals were either inexpedient, too difficult to carry out on a practical basis or economically unjustified.

The Godro-Projekt, the Soviet organization in charge of hydro-construction design, together with the Soviet Ministry of Power Stations, have now evolved a project for transferring two rivers, the Pechora and Vychegda into the basins of the rivers Kama and Volga. This would supply the Caspian every year with over 40 cubic kilometers of water. The flow of water from the northern



CALIBRATED  
REVERBERATION  
TEST ROOMS  
Cutaway view of DeBothezat's  
noise evaluation reverberation test  
rooms, designed and calibrated by the  
acoustics staff of Armour Research Foundation.

## Fan noise control begins Here

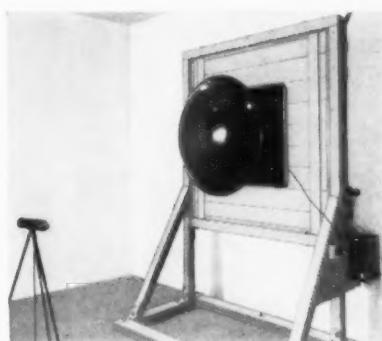
THESE REVERBERATION ROOMS are only a part of DeBothezat's continuing research program devoted to *predicting and reducing fan noise*. It's here that DeBothezat obtains the sound-output ratings (on both inlet and outlet sides) that are now available on all DeBothezat fan units, tested as a complete assembly.

Ratings are stated in both microwatts sound power and decibel sound pressure level in each of 8 octave bands of frequencies, measured separately. Next time you specify or install fans, ask your DeBothezat Sales Engineer for full information.

**"Controlling  
Ventilation Noises"**

**\$2 PREPAID**

when requested on your  
business letterhead



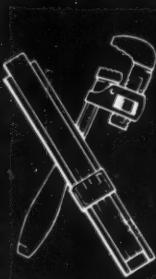
Interior view of the air outlet side of a DeBothezat noise evaluation reverberation test room, with a Power-Flow Roof Ventilator on test. Sound-level meter and microphone are in position — octave band analyzer not shown.

**De Bothezat FANS**

A DIVISION OF  
**American Machine and Metals, Inc.**

Dept. COE-258, EAST MOLINE, ILLINOIS

IN CANADA: Represented by DOUGLAS ENGINEERING CO., Ltd., Toronto • Montreal



## YOU GET EVERYTHING THE ENGINEER & MAINTENANCE MAN ASKED FOR IN THIS NEW LIGHT WEIGHT, COMBINATION STEAM TRAP!

**Fast warm up through rapid removal of both air and condensate up to 10° F. of saturation.**

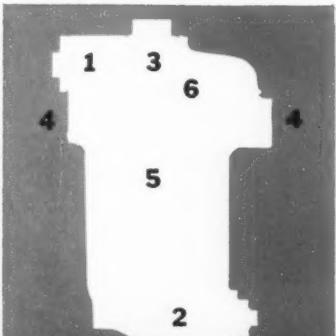
**Continued discharge of air and condensate at steam temperature.**

**Built-in filtration of solids**

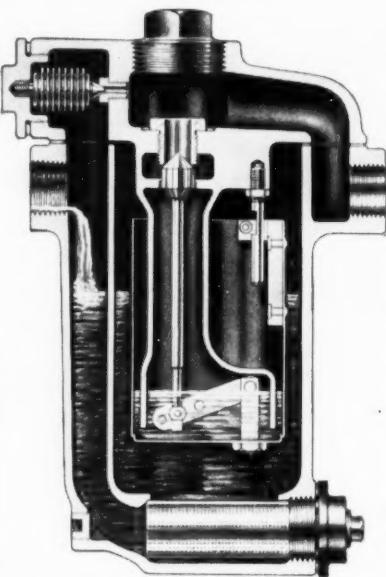
**Easy access to all working parts**

**Interchangeable main orifice**

**Light enough to be supported by line**



1. Monel thermostat air by-pass
2. Monel strainer
3. Valve seat accessible through inspection plug
4. Straight-through pipe connections
5. All operating parts stainless steel
6. Working parts removed with cover



**500-C Series—For 1/2" to 2" pipe lines; Pressures to 150 PSIG; Capacity to 30,000 lbs./hr.**

**For fast and continuous heat in:**

- Unit heaters**
- Hot water heaters**
- Steam mains**
- Laundry equipment**
- Platen presses**
- Heat exchangers**
- Cylinder dryers**
- Jacketed Kettles**
- Sterilizers**
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rivers into the Kama and the Volga would increase the power generating capacity of the Kama-Volga cascade by about 10 billion kwh a year. A new Kama-Vy-chegda-Pechera water reservoir would make it possible to develop the waterways for the transport of coal and timber on a large scale; and finally the annual 40 cu km of water would raise the Caspian to its former height.

One of the practicable measures that would help maintain the level in the Sea would be cutting off the Kara-Bogaz-Gol bay from the main body of the Sea. Useless from a commercial point of view, the bay only serves to increase the rate of evaporation of the water. This solution had been offered before but was complicated by the fact that the large silicate industry located there could not exist without large quantities of sea water. In recent years, however, deposits of new kinds of raw materials have been discovered in Kara-Bogaz-Gol which make it possible to expand the production of silicate without the use of sea water. Separation of this bay would require only construction of a relatively simple dam.

Another suggestion is that the level of water be regulated not over the whole sea, but only in its northern part. A dam could be constructed across the sea to separate the northern and the southern parts of the Caspian. The northern part would become a water reservoir rather than a sea.

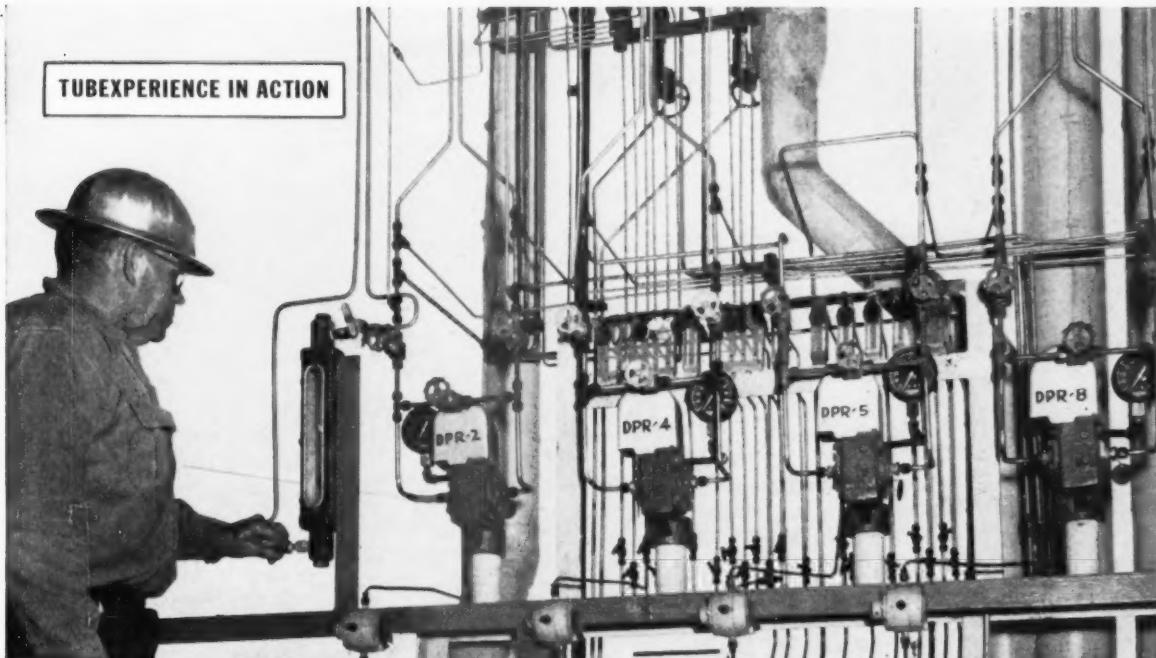
### From Desert to Garden

The USSR is launching an all-out offensive against the encroaching sands of the forbidding Gobi Steppe (the Hunger Steppe) a huge area of southern Kazakhstan and Uzbekistan near the ancient cities of Tashkent and Samarkand. For centuries the waterless wastes have remained barren, although there is evidence that at one time this area was extensively cultivated and irrigated. It has an excellent climate and 800,000 hectares (1,967,000 acres)

# Consulting Engineers Specify Superior for Instrumentation Tubing

*in*  
**Refineries—Chemical processing plants—Power plants**

TUBEXPERIENCE IN ACTION



Typical pilot plant installation using Superior tubing for instrumentation lines. Its good ductility permits bending and flaring for symmetrical installation that offers maximum accessibility and less downtime during setup changes.

**Costs no more—but look at the advantages!**

- Lighter weight
- Greater strength
- Fewer fittings
- No threading
- No welding
- Bends and flares easily
- Tighter joints
- Clean, smooth IDs
- Assures less pressure drop
- Meets applicable ASTM and ASME specifications—or your own

Here's how to put extra insurance into every job. Simply specify Superior tubing, as so many consulting engineers are doing. You can be sure of getting long, trouble-free service. Superior is being specified regularly for such applications as process and control lines in small pilot plants of every type; control and process analyzing lines for large pilot and production plants; fluid and gas handling systems for power, chemical

processing and atomic energy plants; steam trace lines; natural gas lines to controllers and pressure gages.

Our metallurgical and physical test laboratories are at your service for any tubing problems. Let them control your standards of raw material, production and final specifications, as they do for us. We also offer facilities for hydrostatic testing to 25,000 psi and for machine flaring to check ductility and surface quality.

We produce tubing in over 120 standard and special analyses, in a wide range of sizes and shapes, all with carefully controlled mechanical properties and smooth, clean, uniform IDs and ODs. Both seamless and the more economical Weldrawn® (welded and drawn) forms are offered. OD-ID dimensions can usually be specified at no extra cost.

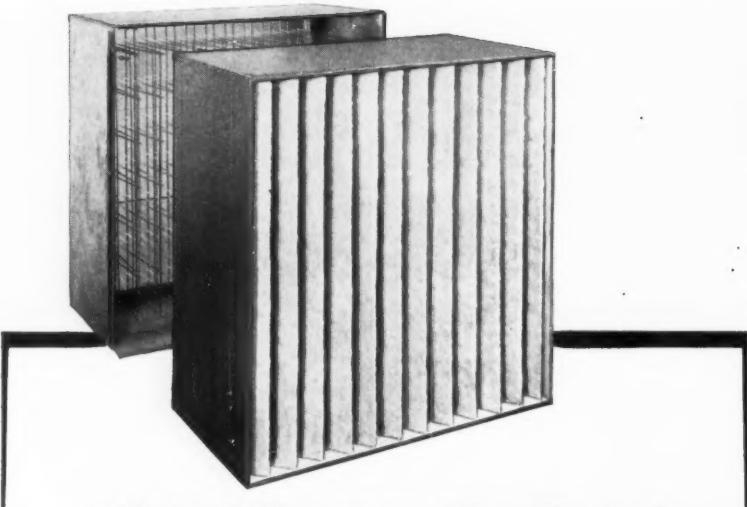
*Available in straight random, cut or multiple lengths to 39 ft. maximum; coils up to 500 ft., depending on material and tubing size.*  
Write for a free copy of latest technical data on stainless tubing. Ask for Catalog Section 21. Superior Tube Company, 2029 Germantown Ave., Norristown, Pa.

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*All analyses .010 in. to 5/8 in. OD—certain analyses in light walls up to 2½ in. OD*  
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## **High-Efficiency Air Filtration is No Longer TOO EXPENSIVE**

You no longer need accept an inadequate "second best" because of high cost of high-efficiency air-cleaning equipment. Cambridge AEROSOLVE® Filters are available at only a fraction of the cost of other high-efficiency equipment. Now, on all process and comfort conditioning jobs, practical consideration can be given to filters that are effective on the atmospheric dust which they will be required to remove—not just on an artificial (large particle) test dust.

### **Efficiency Range, 35% to over 90%**

(N.B.S. Discoloration Test, Atmospheric Dust)

All AEROSOLVE cartridges fit the same cadmium-plated permanent frames, so that changes in supply-air or process conditions can be met with minimum cost, simply by substituting cartridges of higher or lower efficiency as required.

No water, oil, electric or drain connections are required, and only one building trade is involved in installing AEROSOLVE filters. There is no maintenance beyond infrequent cartridge replacement, which is quickly done by unskilled labor.

These are positive, trouble-free filters with the lowest initial pressure drop, 0.16" to 0.35" wg., of any strainer-type filter of comparable efficiency.

**Write for Bulletin 120**

### **Cambridge Filter Corporation**

**730 E. Erie Blvd., Syracuse 3, N. Y.**

Also Makers of the Famous ABSOLUTE® Filter—  
World's Most Efficient Air Cleaning Device

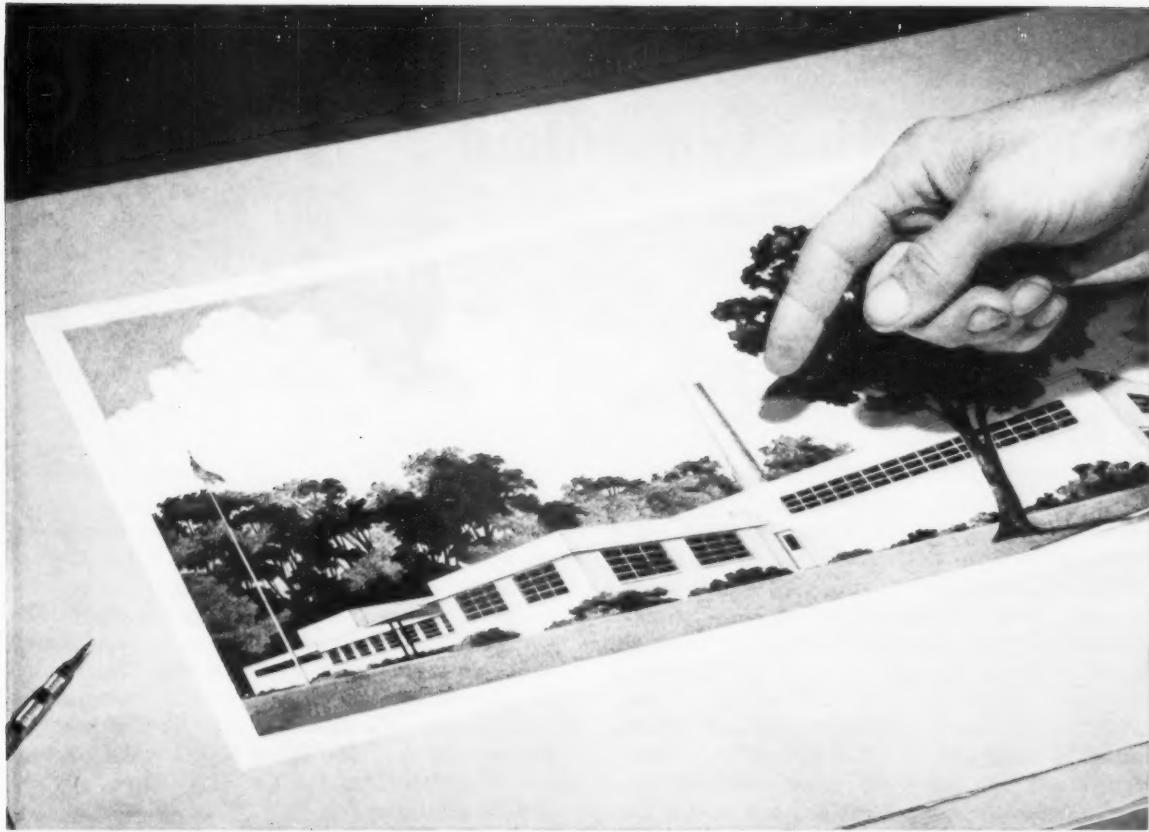
**REPRESENTATIVES IN PRINCIPAL CITIES**

which Soviet surveyors graded "excellent."

The campaign to make this land bear crops again includes the irrigation of some 300,000 hectares for crops and orchards before 1962. Irrigation canals, involving the removal of some 450 million cubic meters of soil, will radiate from several major water reservoirs that will be created by damming rivers.

Work already has started on the Angren River, where in about a year's time a big lake will appear to supply water for irrigation. Work is also proceeding on the Kaska-Darya River dam, a system of hydro-technical installations, and a reservoir holding 500,000 cubic meters of water. The Kirov trunk canal, built before the war, is being widened, and preparations are being made for the construction of further canals on the trunk routes. High voltage transmission line, roads, artesian wells, and settlements are being pushed further and further into the Steppe.

The two trunk canals that are to cross the Steppe will be 150 and 90 km long. In addition, a 20-km mechanical irrigation canal will be cut, motor roads built, and the area completely electrified. The region is expected to have 34 sovkhozes or State Farms of 8000 to 10,000 hectares each; tractor stations; collective farms; and settlements with schools, hospitals, and "houses of culture." A city is planned on the bank of the Kirov Canal and a big power station on the Syr Daria River. The extent of the development bears an unmistakable sign of Khrushchev planning, and while advanced technically is a dubious blessing for the Uzbeks and the Kazakhs. Their previously varied agricultural economy has been adapted, forcibly, to cotton growing dependent on factories in metropolitan Russia. The added area of reclaimed land also will be used mainly for cotton, making the country entirely dependent on Russian markets.



# "Now we can get rid of that stack"

## New Petro FORCED DRAFT burner for smaller boilers (OIL, GAS OR COMBINATION GAS-OIL)

This advanced Petro forced-draft burner is as compactly built and service-free as your home oil burner; yet it delivers some surprising extra values.

First, built into it is a complete combustion system, with forced draft air supply, fuel systems and prewired integral control panel—all assembled and tested at the factory.

Second, it eliminates the need for a high stack, yet requires no induced draft fan.

Third, a burner head of new design cures the old problem of flame pulsation, in both gas and oil firing—in either natural draft or pressurized boilers.

Finally, it is available for either light oil or gas firing—or a combination of both—with instantaneous change of fuel under either automatic or manual control.

Available as a complete burner unit for easy application to any type of boiler, from 18 to 92 bhp. Also available in a complete boiler-burner unit (with Scotch boiler) delivered at site, ready for service connections. For full description and specifications, please mail coupon.

*See Petro Catalog in Sweet's Architectural File*

Makers of Quality  
Heating and  
Power Equipment  
since 1903

**PETRO**  
T. M. REG. U. S. PAT. OFF.

- • • • •
- Forced draft...no stack or induced draft fan required.
- No flame pulsation.
- Single or dual-fuel firing.
- Complete unit with Scotch boiler; or burner only for use with any type boiler.
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PETRO  
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Please send me information on Petro P-240 Forced Draft Gas-Oil Burner.  
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# News for the Consultant

## Application Made to Construct Sultan River Project

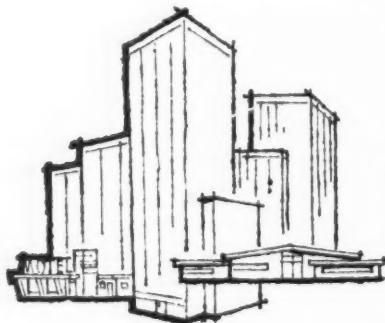
The Snohomish County Public Utility District has completed and sent to the Federal Power Commission its application for a license to construct the multipurpose Sultan River Project, in Snohomish County, Washington. This action, coupled with the Commissioners' action of November 6 formally authorizing the filing, followed several months of extensive feasibility studies and engineering work on the proposed development by R. W. Beck and Associates, Seattle, Wash., consulting engineers for the Snohomish District.

The Sultan project when constructed will provide an important new source of power for the District and will make available to the residents of



Everett and Snohomish County an abundant supply of water.

The Public Utility District first started investigating the Sultan as a source of power in 1949, when the first FPC preliminary permit was obtained and detailed studies started. The Application for License calls for the construction of two major dams, and three powerhouses on the Sultan River. The main dam in the Sultan Gorge will be a concrete arch dam 242-ft high and 320-ft long and will provide approximately 100,000 acre-feet of storage in the basin. A powerhouse having a generating



*In the new, automatic  
world you're making ...*

**Your ideas work better  
when you work  
with HONEYWELL**

**More products** to give your ideas greater scope. From Honeywell you get a great variety of products both mechanical and electrical. Honeywell is the only company that makes a complete line of pneumatic, electric and electronic controls plus instrumentation for commercial buildings. With Honeywell your choice is wider, your ingenuity less restricted.

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**More support.** Honeywell works with you on every job, frees you from annoying details, saves you time, even

helps you sell. And the assistance of Honeywell specialists in each of 112 offices throughout the country is as near as your phone.

Look over the Honeywell products and ideas on the following pages. And, remember, each is backed by the kind of support that only Honeywell can offer you.

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TO WORK WITH ... WORK WITH  
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capacity of 84,000 kilowatts will be constructed at the Sultan Gorge site.

The second dam will be 3½ miles downstream and will be a rockfill structure 190-ft high and 380-ft long. This dam will be used to help regulate the discharge from the main dam and will allow more complete control of the water flowing into Lake Chaplain. A two-mile tunnel will carry the water from this second dam to a powerhouse located about one-half mile above the present Everett diversion dam. This powerhouse will have a generating capacity of 32,000 kilowatts. A second tunnel will be constructed below the 32,000-kilowatt powerhouse, which will allow all of the flow of the Sultan River to be diverted into Lake Chaplain where it will be available for water supply and power purposes.

A two-mile canal will be constructed between Lake Chaplain and a third powerhouse located on the Sultan River below Lake Chaplain. This powerhouse will have a generating capacity of 24,000 kilowatts. All of the water not used for water supply purposes will be used to generate power.

All of the powerhouses will be semiautomatically controlled from a central station. Permanent access roads into the basin and along the river will be included as a part of the project.

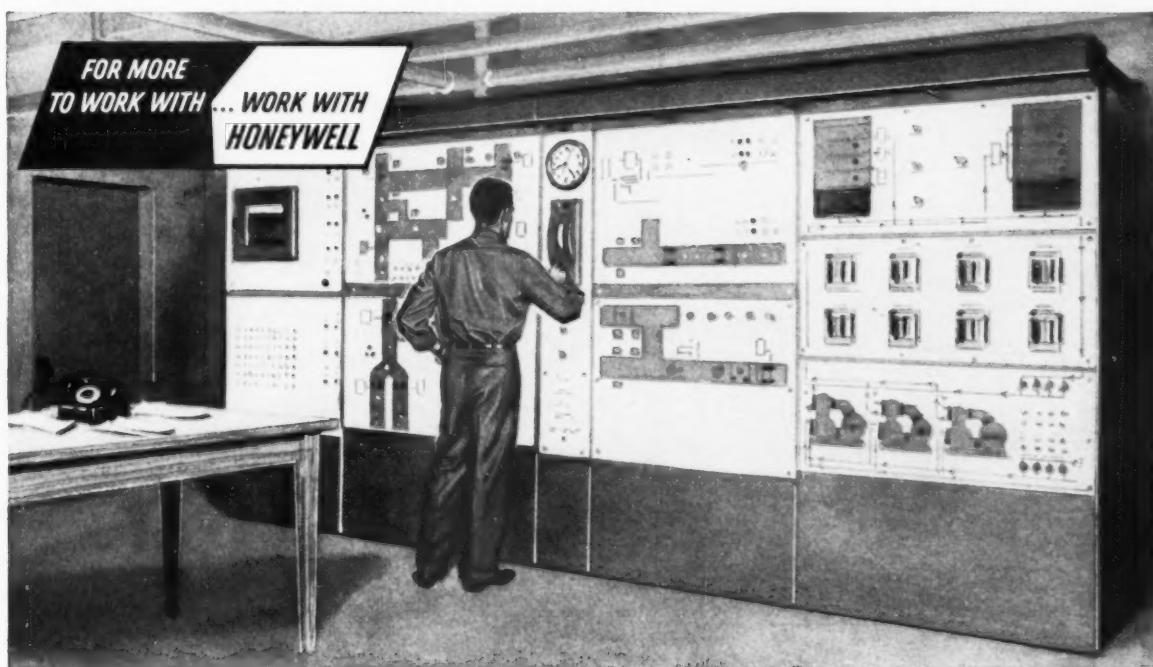
The Application for License calls for construction of the project in two stages. The first stage will include construction of the lower portion of the main

dam in the Sultan Gorge, which would insure adequate water supply for the foreseeable needs of the City of Everett and Snohomish County. The second stage, which will include construction of the balance of the project, will be started in approximately seven years, depending on the power load growth in Snohomish County and the over-all power supply in the Pacific Northwest.

### Big Veterans Hospital in California

Construction has started on one of the largest United States Veterans Administration hospitals in the West. Located on a 93-acre site directly adjacent to Stanford University property in Palo Alto, Calif., the 1000-bed facility will have 15 buildings, enclosing 736,000 sq ft of space. It will cost nearly \$20 million, excluding the value of the land. Its primary use will be a neuropsychiatric hospital, but 252 beds will be allocated to general medical and surgical patients.

The main building will be six-stories high and will be flanked on three sides by one- to four-story buildings. Basic construction will be reinforced concrete. Exteriors of the buildings will be coral-buff colored brickwork, and finished concrete will be painted a buff color with a plastic base paint. Windows will be double-hung and projected types. Tunnels will house steam lines from the central



**Supervisory Data Center** for the Philadelphia Transportation Center, a unique 18 story building which includes offices, stores and a bus terminal. It is another in the long list of buildings to use a Honeywell Supervisory DataCenter to centrally control

its entire year 'round air conditioning. Owner and Builder: McCloskey & Company; Architect: Vincent G. Kling; Mechanical and Electrical Engineers: Robert J. Sigel, Incorporated; Structural Engineers: McCormick & Taylor Associates.

steam generation plant to each building. They also will be used for the other utilities. Air-conditioning will be included where necessary.

Welton Becket and Associates, Los Angeles and San Francisco, architects and engineers, designed the buildings.

### New Jersey to Hold Reservoir Referendum

A referendum next November on a \$40-million bond issue, backed by the State's credit, to finance development of a Round Valley reservoir in Hunterdon County has been advocated by a special, bipartisan New Jersey Senate committee.

Legislation to provide for the bond issue referendum is expected to be acted upon early in 1958. Meanwhile, related bills were slated for State legislative action before the end of 1957. These included a measure appropriating \$250,000 for engineering studies of the reservoir by the State Department of Conservation and Economic Development. Water sales subsequently would repay the State.

### New Student Union Building at U.C.L.A.

Plans have been approved by the Board of Regents of the University of California and the Asso-

ciated Students of U.C.L.A. for a new \$5-million Student Union building. The project also includes remodeling of existing facilities in Kerckhoff Hall, the present student union. Welton Becket and Associates, architects and engineers, did the designing.

Reinforced concrete construction will be used up to the second level where a structural steel frame with reinforced concrete floor slabs will support the



ARCHITECTS RENDERING OF NEW UCLA STUDENT UNION.

large open spans required by the cafeteria and lounge-ballroom. The 85-ft by 170-ft main lounge will be completely free of columns and will accommodate 1500 couples for dancing. The roof structure will incorporate a cooling tower, mechanical equipment, and elevator machinery for the completely air-conditioned structure.

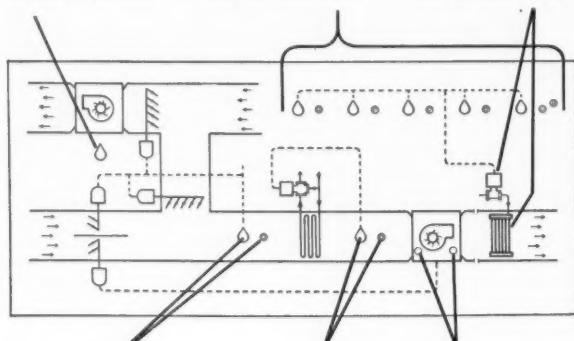
Exterior and interior surfacing materials include

### Honeywell Supervisory DataCenter\*

## One-man control of a building's entire air conditioning system

#### Details from just one module of the Supervisory DataCenter in the Philadelphia Transportation Center

- A. Exhaust air fan switch. Pilot light indicates operation.  
B. Temp. selector knobs and check buttons for each zone.  
C. Symbol for steam valve and reheat coil for each zone.



- D. Temperature indicating dial.  
E. Temperature selector knob and check button for mixed air temperature.  
F. Start-stop buttons for supply air fan. Pilot light in symbol indicates operation.

The DataCenter shown here is an example of the centralization of control for year-round air conditioning systems. This panel enables one man to check and adjust the temperature at all important points. He simply pushes the check button and reads the temperature on the large indicating dial in the center of the panel. Chilled water, condenser water and cooling tower pumps, compressors, fans and valves can be operated right from the panel. System malfunctions are quickly observed and analyzed right from the panel. Repair crews can be sent to the trouble source.

A systems control center like this can give your clients more efficient operation of their air conditioning system. Honeywell can also include such other functions in your centralized panels as communications, record keeping and alarm and detection systems. A Honeywell specialist will work with you in designing a center to fit your clients' needs. \*T.M.

**Honeywell**

**H** First in Controls

the school's traditional red brick veneer with contrasting rubble field stone, architectural concrete, and exposed aggregate concrete. Colorful glass mosaic panels will give a distinctive design character to the Westwood Boulevard elevation of the building.

### **Oil to Finance California Water**

A 1958-59 fiscal year budget request of the California State Water Resources Department for \$77 million to build water projects, financed by tide-land oil royalty reserves, may be placed before a special session of the California legislature rather than the State legislative budget session, which will start Feb. 3.

State Finance Director John M. Peirce said it would all depend on what progress was made in settling the dispute between the northern and southern parts of the State over water rights—which blocked a similar request during the 1957 legislative session. Failure to settle the water rights controversy before the Feb. 3 budget session of the legislature, it was pointed out, might result in the water fight delaying the entire state budget.

The proposed water budget would include the following items, among others:

Completion of relocation of the Western Pacific Railroad Co. tracks and US Highway 40 Alternate;

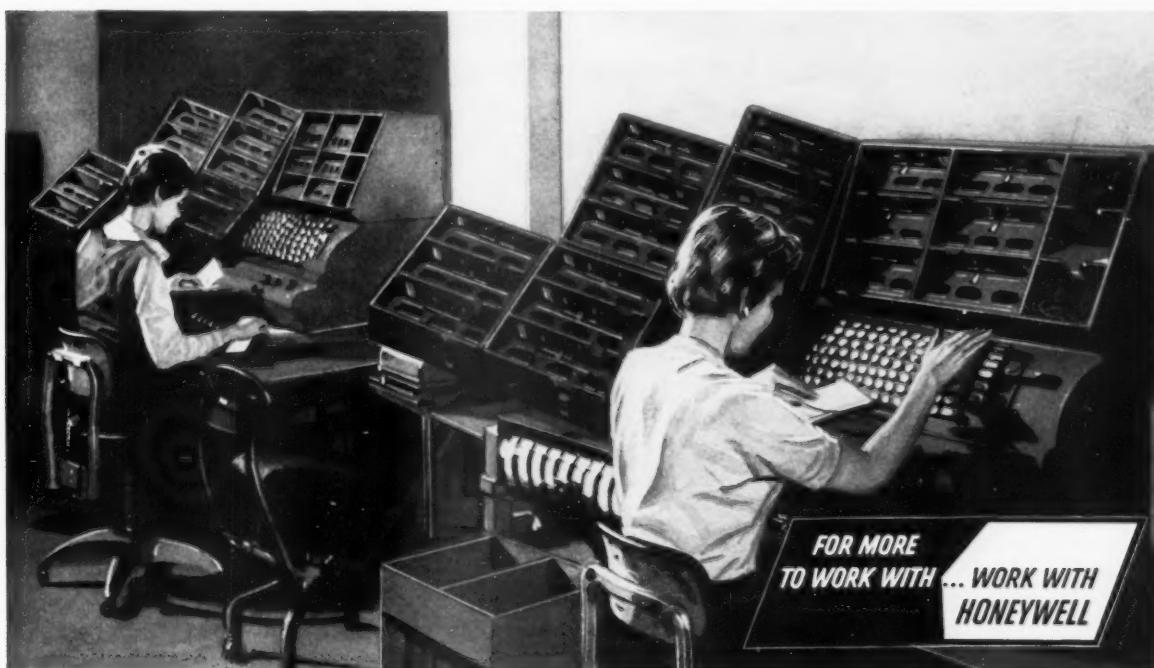
construction of a combination railroad-highway bridge over the West Branch of the Feather River and relocation of a county road from Enterprise to Feather Falls, all in Butte County, to pave the way for construction of Oroville Dam.

Construction of the first of the five proposed Upper Feather River Service Area dams. This would be the Frenchman Dam on Little Last Chance Creek, a 50,000-acre foot capacity reservoir to serve the Sierra Valley east of Quincy, Plumas County.

Boring of the Brushy Peak Tunnel in Alameda County, first unit of the South Bay Aqueduct, and the Elkhorn Peak Tunnel on the Napa-Solano County line, initial unit of the North Bay Aqueduct. The canals would take water from the Sacramento-San Joaquin Delta to the rapidly developing bay areas.

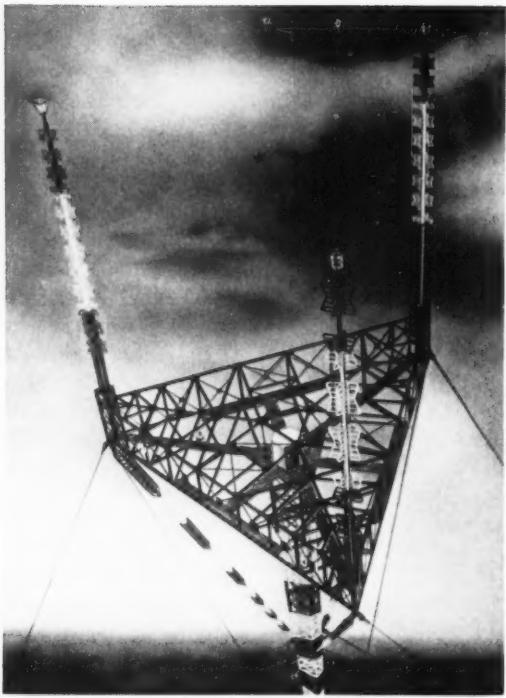
### **New Steel for TV Towers**

New TV tower designs have been made possible by a special steel, "T-1," used for a recently completed tower in Boston. It also will be used in another tower being fabricated for erection in Baltimore. "T-1" steel from U.S. Steel's Duquesne Works, is a proven engineering material developed after extensive research and experimentation. Already used in a wide array of applications, the



**Electronic Air Cleaner Installation** in the Lake Street office of the Northwestern National Bank, Minneapolis, Minn., has in just five months brought a reduction in cleaning, decorating costs, has also reduced maintenance for such delicate working mechanisms as these proof machines.

Bank Mgr.: Leroy H. Berg; Arch. and Eng.: Magney, Tusler & Setter; Gen. Contractor: George W. Madsen Construction Co.; Vent. & Air Conditioning Contractor: O'Brien Sheet Metal Works; Elect. Contractor: Harris Brothers Plumbing Co.; Plumbing & Heating Contractor: J. McClure, Kelley and Co.



TV TOWER PLANNED FOR BALTIMORE WILL HAVE  
CANDELABRA TOP WITH ANTENNA ON EACH CORNER.

quenched and tempered low carbon constructional alloy is, according to the manufacturers, an outstanding TV tower engineering material.

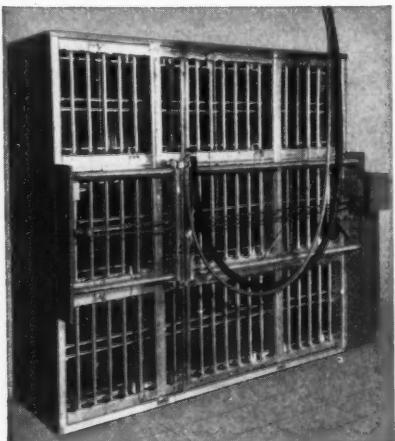
Having nearly three times the yield strength of structural carbon steel, it has the ability to withstand the unusual stresses encountered in massive TV tower structures. It has a high yield strength of 90,000 psi and will stand up under pressure and shock at both high and low temperatures. This unusual property enables consulting engineers to design with less steel—and save money for their tower-owner clients. In addition, "T-1" steel has four times the atmospheric corrosion resistance of carbon steel.

Use of "T-1" in the Boston tower leg design resulted in a 15-percent cost savings and a 44-percent material savings. Because of the new steel's high strength, the cross-sectional area of the leg bars in the Boston tower is only 56 percent of the area that would have been required with use of structural carbon steel. The thinner, stronger legs also result in a decrease of wind resistance.

The Baltimore tower is scheduled for erection next February. It will feature the East Coast's first "Candelabra" top, a triangular superstructure nesting on three, 622-ft legs. Points of the platform will be 100-ft apart with WBAL-TV, WJZ-TV, and

*For your mechanical systems...Honeywell's Electronic Air Cleaner*

## **eliminates dirt six times more effectively than ordinary filters.\***



**EASY INSTALLATION** of Field Assembled models is provided by match-marking at factory, regularity of cell building blocks and detailed instructions provided with each model. Modular construction allows fabrication in almost any size.

The Honeywell Electronic Air Cleaner gives your clients reduced cleaning and decorating costs, reduced maintenance for machinery, better health and comfort for personnel. And it very often reduces heating and cooling costs because the amount of outside air taken into the building can usually be decreased.

Two types of Honeywell Electronic Air Cleaners are available to fit any air conditioning or ventilating system: Field Assembled models which are built and tested at the factory, disassembled and shipped to job site for erection in the ductwork; and Custom Package models, built with a package-enclosure, tested and shipped completely assembled for installation.

For expert information and assistance in specifying, or installing Honeywell Electronic Air Cleaners, call the Honeywell office nearest you. Or write Honeywell, Dept. CO-2-32, Minneapolis 8, Minn.

\*According to tests developed at the National Bureau of Standards.

**Honeywell**



*First in Controls*

WMAR-TV each having an antenna on a corner.

At present Boston's WBZ-TV tower supports a 6-bay antenna. Built to replace one knocked down by Hurricane Carol, it allows for addition of more height and weight as specified by the Westinghouse Broadcasting Company. Two additional TV antennae can be mounted beneath the WBZ antenna with no tower modifications. By temporarily removing the antennae, an additional 300 feet of tower sections can be stacked on the present structure to a total height of 1499 feet — or 1649 feet above mean sea level.

### Roughing it in Florida, or Home is Where Your Wall Safe is . . .

Construction work on the nation's most dramatic cooperative apartment building, a 14-story glass-and-aluminum "tower to the sun," started last month. S. A. Spiller, of Miami Beach, says that he will erect the apartment building, expected to be the most lavishly appointed structure of its kind, in H. B. Layne's Golden Isles development. This is a premium quality, multi-island community rapidly nearing completion in Hallandale, Fla.

There will be only 28 apartments in his \$1.5-mil-

lion "Tower of Golden Isles," Spiller said. Apartment prices will range from \$51,500 to \$65,000. Two penthouses will be priced at \$75,000 and \$125,000.

Every apartment will have four-way exposure. Glass walls of the Tower will provide unobstructed views of the Atlantic Ocean, Intra-coastal Waterway, Golden Isles Lake, the new Diplomat Hotel Golf Course, and Miami Beach and Hollywood.

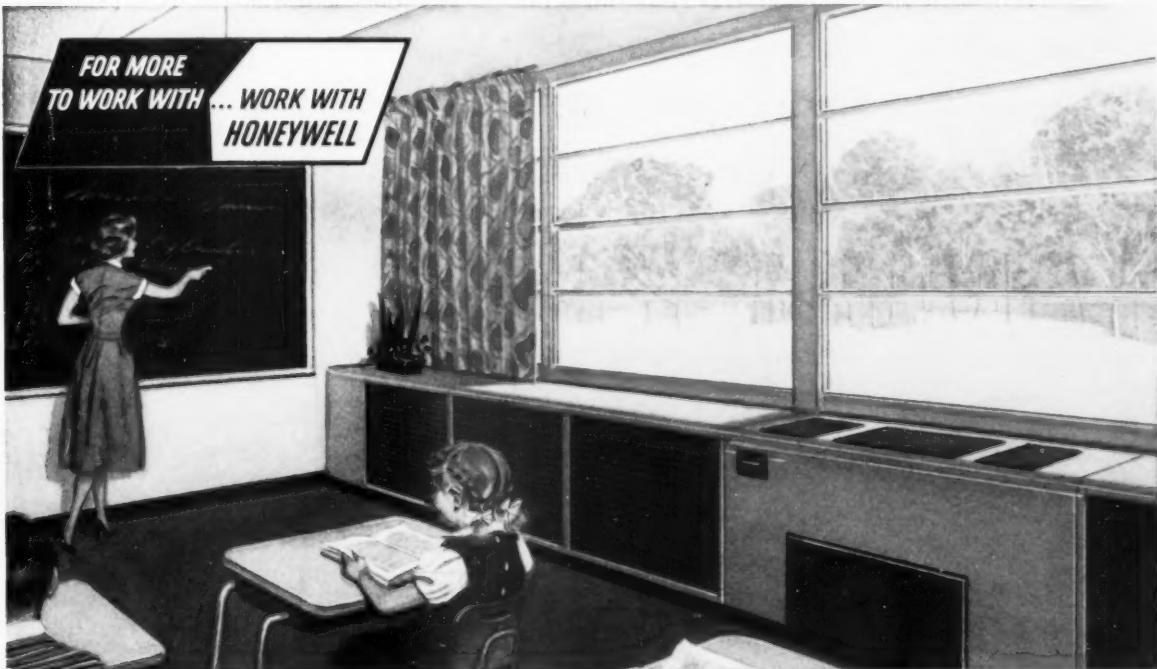
Spiller, the 44-year-old builder, handled construction for RKO Theatres from coast to coast, for over 20 years.

The structure will be erected by the Lift Slab method of construction, and will be the tallest lift slab building in the world.

A great many architectural, interior, and decorative innovations will be included. The building is actually two spires arranged in a point-to-point diamond pattern. A central core, containing elevators and service stairways, unifies the twin buildings.

All apartments will have 2500 sq ft of living area. Each will have a 53-ft long wrap-around outdoor terrace on the north and east sides and similar smaller terraces on the south and west sides.

Sliding glass window walls in the 23-ft square living rooms will open on to the north-east patio to form a 31-ft square indoor-outdoor living area. The terrace on the other side has an identical glass



The Unit Ventilator System of heating, cooling and ventilating permits an ideal thermal environment particularly valuable in schoolrooms. In addition, the system

gives protection against window down-draft without expensive auxiliary radiation or extra piping. Adjoining cabinets in this installation are used as bookshelves.

wall arrangement so that the dining room can also extend into the outdoors for *al fresco* (a type of fresh egg noodle) meals.

"We're sparing no expense in appointments, fixtures, equipment, and new design features to be used in the 'Tower of Golden Isles,'" Spiller said.



LUXURY APARTMENT TO BE BUILT IN GOLDEN ISLES.

"Every advance and comfort designed for luxurious living has been incorporated."

Purchasers will have the opportunity of selecting virtually all interior details such as permanent wall paneling, colored kitchen and bathroom fixtures

and equipment, mosaic marble and cork flooring, wood grains on the many built-in facilities, and lighting fixtures. Bookcases will be permitted.

Every apartment will be equipped with a wall safe. Each apartment will have its own air-conditioning, reverse-cycle heating plant. Television plug-in receptacles and telephone jacks will be provided in each room. There also will be hi-fi wiring to each room and the terraces.

Kitchens will have a brick island cooking area which will include an automatic charcoal barbecue pit and spit for those who like to rough it. In addition to the twin copper ovens, there will be wall freezer and refrigerator units in the purchaser's color choice, a dishwasher, and, naturally, a built-in blender. The kitchen's south end will be a full window wall. Overhead will be a completely illuminated ceiling. A disappearing Shoji screen (a Japanese improvement on Todd-AO) will separate the kitchen from the dining room.

The master bedroom, according to the publicity release, will have window walls on two sides, and in addition, separate dressing areas and lavatories for "him" and "her," a 7-ft walk-in closet for the man and a 10-ft closet for the woman. In the bathroom will be a sunken, oversized tile bathing pool and glass enclosed shower. The west wall of this pool will be of translucent glass, affording privacy

*For your mechanical systems...Honeywell's Unit Ventilator Team*

## **Eliminates hot and cold blasts, gives better unit ventilator performance**

This Honeywell control team of air stream thermostat, valve, damper motor and room thermostat exclusively developed for unit ventilators, levels the peaks and valleys of heat and cold so troublesome in high occupancy areas such as schoolrooms.

Air temperature delivered by the ventilator changes

only as a result of change in room temperature. Cycles of hot and cold are sensed by the air stream thermostat and corrected before they start. All members of the "team" work together smoothly and efficiently. For full information, call your local Honeywell office, or write Honeywell, Dept. CO-2-32, Minneapolis 8, Minnesota.



**M0516 Damper Motor.** Rolling diaphragm reduces friction, gives more precise position. Diaphragm prevents sticking, thus adds to modulated action of the control team.



**V0512A Valve.** High temperature rolling diaphragm combined with low friction Teflon cone packing gives improved modulation, eliminates jerky step-by-step action and gives smooth positioning.



**L0907 Air Stream Thermostat** has fast response and fewer moving parts. Working with the room thermostat, it resets the air temperature delivered by the ventilator.



**T0901A Pneumatic Round** is the most accurate schoolroom thermostat available today. Low mass bimetal for fast response. Easy to calibrate and adjust.

**Honeywell**

**H** First in Controls

yet giving the feeling of outdoor bathing. Overhead will be a completely illuminated ceiling.

The second bedroom will convert easily into a den or study (that's what the release said, "den or study"). This is also virtually a suite, with private terrace, west window wall of glass, private bath, and shower.

The "Tower of Golden Isles" will be set in landscaped gardens which will carry through into the building's open entrance lobby. Owner's cars will be parked behind a landscaped wall placed so the vehicles will never be visible from the street or the play areas in case there is an occasional last year's model. On the street level will also be an air-conditioned get-together room for the apartment owners that also will serve as a formal private banquet room.

Directly on the crescent-shaped Golden Isles Lake will be a 100-ft long T-shaped dock for Tower residents' yachts. The dock will lead to an elevated sun deck, which will have a circular stairway to a screened-in pool and a play area.

The "Tower of Golden Isles" will be completed for November 1958, occupancy. The Spiller Company is building it.

The architectural firm of Joseph, Vladeck and Abraben, Miami Beach and New York City, designed the Tower. Lift Slab of Florida, Inc., of Hal-

landale, will perform the Lift Slab operations. Rich people will live in it.

### Ohio Wants More Highway Money Now

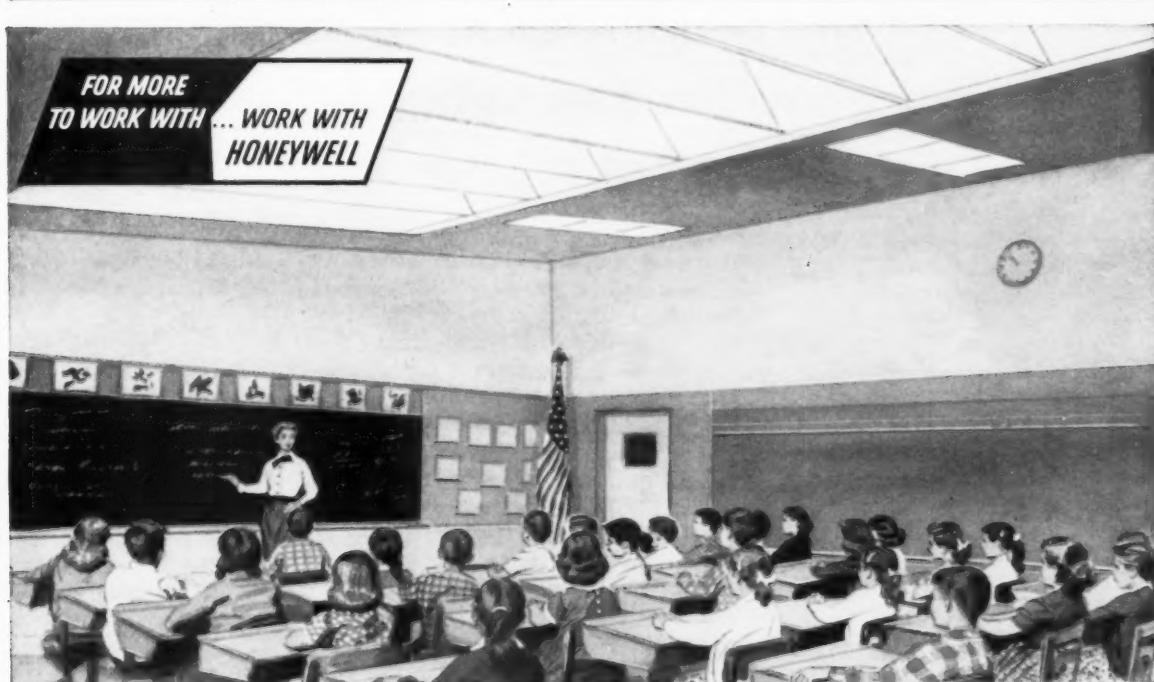
Governor O'Neill says he will become more active in plans to bring Federal-aid money into Ohio quickly for expansion of the State's highway construction program.

The governor's announcement was made after State Highway Director Charles M. Noble revealed that Ohio would attempt to get Federal funds ahead of time. Noble pointed out that Ohio is ready to go ahead while other states apparently are not moving as rapidly with their highway construction.

Noble expressed the desire to place \$400 million worth of road projects under contract in 1958. Present plans call for putting half of this amount under contract during the first five months of 1958.

Ohio has been juggling its highway projects in the 1958 construction program to avoid running out of money while awaiting Federal funds. The State's 1958 program also has been hampered by the fact that the U.S. Bureau of Roads has not announced state allocations for the year.

O'Neill said he hoped to work out plans with Noble to convince the Federal government that



In the Sequoia School, Manteca, Calif. natural daylighting really pays off with the Honeywell Light Saver. This phototube system automatically adjusts light intensity, assuring constantly correct lighting balance.

Architect: Mayo, Johnson & De Wolf, Stockton, Calif.; Elect. Eng.: Williamson & Vollmer, Oakland; Mech. Eng.: Keller & Gannon, San Francisco; Elect. Contractor: Collins Electric Co., Stockton.

states such as Ohio should have more money because they have plans ready to move up their time schedules. It was noted that some Federal money is lying in a special trust fund since other states are actually behind schedule. Noble believes this money should be allotted to states that are ready.

Ohio several months ago had about \$40 million tied up on Federal projects. The money was not released by the Federal government because of technical details. Meanwhile, the State contracted for the work and had to pick up the check. The \$40 million has now been reduced to \$22 million and further reduction is expected soon.

### Dallas-Fort Worth Sports Center

A \$34-million sports and family recreation center will occupy 293 acres in the center of the Dallas-Fort Worth metropolitan area, as a component of the Great Southwest Industrial District, the nation's largest planned industrial development. The Great Southwest Sports Center, including a Disneyland-like Great Southwest-Land, will be located at the intersection of the Dallas-Fort Worth Turnpike and Expressway 360.

Great Southwest-Land is being designed and en-

gineered by Marco Engineering Co., of Los Angeles, the principals of which were associated with the design and early operation of Disneyland. Artists, designers, and planners have adapted miniature towns, Indian encampments, canyons and cliff dwellers, stage-coach routes, saloons, oil fields, rides, and refreshment areas to the color, history, and heroes of the Southwest. Powell and Powell of Dallas are the civil engineering consultants on the whole Sports Center.

One major installation in the Center will be a 100,000-sq ft retail store that will carry complete lines of sporting equipment. Facilities for the demonstration and testing of equipment will be the most extensive in the country and will include casting ponds; shotgun patterning ranges; a boat lake; skin-diving pool; rifle, skeet, and pistol ranges; a quail run; moving deer target range; archery and driving ranges; and camping equipment areas. In year-round operation, the Sports Center will schedule the continuous appearance of internationally-known sportsmen and athletes in demonstration and competition exhibitions.

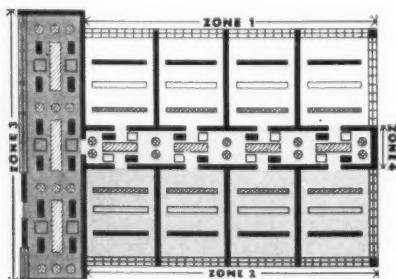
C. V. Woods, president of Marco Engineering Co., said that the Sports Center and Great Southwest-Land, would attract 2-million persons a year.

Adjacent to the sports and recreation center is

*For your Electrical Systems...The Honeywell Light Saver\**

## **gives precise light control, helps cut electric bills up to 80%**

- 1st stage: Comes on first. Turns off last.
- 2nd stage: Turns on as more internal lighting is needed.
- 3rd stage: Turns on last. Off first.
- Skylights.



#### **HOW IT WORKS.**

1. The building is divided into zones. All rooms in any zone have the same lighting requirements.
2. A Light Saver photocell accurately measures the amount of daylight entering each zone.
3. Each photocell's signal automatically operates a switching motor which decreases or increases a zone's artificial lighting, a little at a time.
4. When darkness is desired lights can be turned off with a manual switch. When switched on again, all lights return automatically to photocell control.

Here's a system that gives your clients the real benefit of modern daylighting, through the combined efforts of the architect, you and Honeywell.

The Honeywell Light Saver uses phototubes plus Honeywell precision switches and controls to supplement daylighting with perfectly balanced artificial lighting. Tests prove savings as high as 80% in electricity costs.

Its applications are numerous, especially in the school and institutional field. The Honeywell Light Saver can be used to control either fluorescent or incandescent lighting. And it's backed by years of testing and research plus the Honeywell guarantee. A Honeywell specialist will assist in applications, provide you with all the information you want for specifying. Call him at your nearest Honeywell office. \*T.M.

## **Honeywell**



*First in Controls*

an area designated for a large regional shopping center. These two areas, along with the community centers for office buildings, restaurants, parks, and chapels—and the distribution core with its 1-million sq ft public warehouse and consolidated truck terminal—are the basic units that will form a total, planned industrial district.

### States Make School Construction Plans

A Kentucky proposal for a referendum on a State bond issue to provide State aid for school construction will be submitted to the 1958 legislature by the State Department of Education, according to announcement by Dr. Robert R. Martin, State Superintendent of Public Instruction.

A detailed proposal has not been decided upon yet. Although department officials have considered the idea of a \$100-million bond issue, Martin said that is "not enough to do the job."

The program would provide construction funds for all public schools in Kentucky, including the University of Kentucky, the State colleges and vocational schools, and elementary and secondary schools. Funds would be distributed to local school districts on the basis of need and financial ability.

In Texas, a program of State aid to districts needing help in school building was advocated by Governor Daniel in addressing a civic group in Austin.

"If we fail to use tax money close to home in performing the essential functions of government," the governor declared, "Washington will collect the taxes and have more money to perform the functions we should have cared for in the first instance."

Citing the present controversy over Federal aid in schoolhouse construction as an example, Daniel declared, "If a school district is financially embarrassed to the point where it cannot take care of its construction needs, the State has the next obligation to help—not the Federal government. With Federal money will come some measure of Federal control of our schools—and our greatest bulwark of local self-government will be breached."

Texas districts spent \$128 million building schools in the 1956-57 fiscal year. This is at about the rate administrators say will be needed to care for increased enrollment and replacement of buildings which become too old for further use.

A survey made by the Texas State Teachers Association indicated that an additional \$120 million would be needed to put all present buildings into first class condition.

Four basic recommendations for revising Vir-

*For your Electrical Signalling System . . .*

## **The Honeywell Hotel/Motel Master\* puts up to 24 separate functions under one-man control**

Already installed in some of the country's smartest new hotels and motels, this Honeywell Hotel/Motel Master means labor savings and extra convenience for the hotel operator—better service for his guests. Incoming information signals and outgoing command signals provide efficient front desk supervision over maid service and guest room status. And in each installation this new system has proved that electrical signals are cheaper and faster than footsteps.

A Honeywell specialist will be glad to discuss these new system techniques for hospitals, schools and a wide variety of other applications.

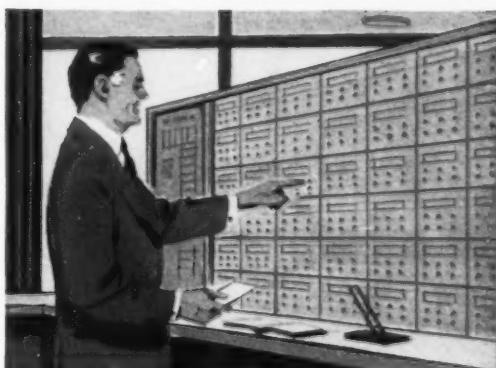
Honeywell offers the owner a contract for complete maintenance on a low-cost annual basis, backing up your service and ours. For further information, call your nearest Honeywell office.

\* T. M.

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*First in Controls*



From one console, a desk clerk can read instantly the status of each room; vacant, occupied, being made-up, ready for occupancy. He can signal a maid, inform a guest a message is waiting, adjust lights, TV, air conditioning as guests arrive and depart. A light warns him if a fire starts, gives its location. These and other functions—up to 24—are performed automatically with the Hotel/Motel Master.

ginia's school construction code have been made by an advisory research committee. The proposals were included in a preliminary report submitted to the State Board of Education by the Virginia Advisory Legislative Research Committee on School Buildings, a group set up by the legislature.

As outlined by M. L. Carper, superintendent of Martinsville public schools and chairman of the study group, the basic recommendations do not sound too good for consulting engineers. The report suggested:

¶ The State Board of Education should provide a consultative and advisory service to the localities before and during the planning of school buildings instead of the present system of regulatory checking after plans have been drawn.

¶ A continuing program of research on construction should be carried on within the State. This could be provided through the architectural departments at Virginia Tech, the University of Virginia, and the State Department of Education.

¶ Provision should be made for an intermediate step in approving school building plans which would give more discretionary powers to the State Superintendent of Public Instruction.

¶ The mandatory features of the State's school building manual should be separated from the rec-

ommendations, so that minimum requirements will not be confused with those that are advisory.

The preliminary report said the committee "is speeding up its work as much as possible because it is our belief that many changes can be brought about in the immediate future which will make possible the construction of more economical and more functional school buildings."

State Public Instruction Superintendent Lloyd J. Andrews recently declared the State of Washington has gone too deeply into debt in building new classrooms and may be jeopardizing future school construction programs.

He expressed the view that State aid to local school districts after 1959 should be from present appropriations so that bonded indebtedness can be reduced. He did not say how the money should be raised, but observers pointed out that the State cannot do it within its present tax structure.

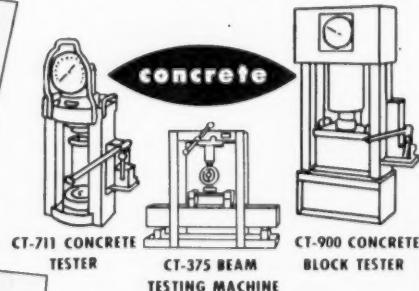
The State Finance Committee in October sold \$52 million worth of bonds to finance construction of classrooms during the 1957-59 fiscal period. The sale brought to a total of \$142 million the amount of school bonds issued by the State since 1949.

Meanwhile, the State has paid off only \$21,369,000 of the debt. Together with \$187,354,000 in bonded debt of local districts that put up matching funds,

# ACCURATE LABORATORY OR JOB-SITE TESTING...

improves quality control  
prevents over-design  
lowers project costs

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the total debt is nearly \$308 million or \$535 for each pupil.

On the basis of an estimated average interest rate of 3 percent, the cost to the State would be more than \$9 million a year.

"Our debt service is too high," Andrew said. "It might have been a good policy in the past to go out and create a bonded indebtedness, but I think we are reaching the danger point."

### Texas Water — It's the Greatest

A bill enacted by a special session of the Texas legislature to provide for a State water planning program recently was signed into law by Governor Daniel, who termed it "the greatest accomplishment for the proper conservation of the water resources of Texas in the history of our State."

The measure gave the State Board of Water Engineers \$1,165,000 with which to plan most effective conservation and use of the State's water resources. It directed the board to set up a planning division, headed by a \$10,000-year planning engineer. The new division will do basic research and investigations on surface and underground water and evaporation control.

Preparation of a state-wide water report on the State's water resources was authorized by the measure for submission to the next Texas legislature. The board also was authorized to make preliminary negotiations for storage space in Federal reservoirs, with final decision left to the State.

Enactment of the new water planning legislation followed adoption by the electorate in November of a State constitutional amendment authorizing issuance of \$200 million in bonds for water conservation projects.

### District Engineers to Decide on Chesapeake Bay Project

A hearing was conducted Jan. 16 in Norfolk on the question of whether a "menace to navigation" would be presented by a proposed \$144-million Chesapeake Bay bridge-tunnel crossing which would link the Virginia counties of Northampton and Princess Anne.

Proponents and opponents were given a chance to air their views. Then, the U.S. District Engineer's Office, which is charged with the responsibility of determining whether any part or all of such a water crossing could obstruct navigation,



\*Store Designer: A. H. Bradley, Omaha, Nebraska  
General Contractors: Carlson, Rocky & Jamison, Inc., Des Moines, Iowa  
Air Conditioning Contractor: H. V. Cassaday Refrigeration Co., Des Moines, Iowa

- Three important factors in air conditioning supermarkets are achieved in the new, beautiful, modern Hinky-Dinky Food Store\* in Des Moines, Iowa. The installation uses two Thermal central plant air conditioning units with capacity totaling 70 tons.

More and more finer structures in all parts of the country are using Thermal Engineering equipment. Quality and efficiency has proved Thermal can be specified with the confidence that it will deliver satisfaction, year after year. Thermal equipment includes a complete line of central plant and multizone conditioners, sprayed coil units, heating and ventilating units, heating and cooling coils, and air-cooled condensers. Write for catalog.

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will make its recommendations concerning a construction permit for the project.

Several weeks after the hearing may be required before the New York area office of the Army Engineers makes its decision and forwards its findings, as well as those of the Norfolk district office, to the office of the Secretary of the Army for final action.

Although Maryland shipping interests are expected to contend a high-level bridge across the Baltimore ship channel would menace navigation, members of the Chesapeake Bay Ferry Commission have expressed confidence that the Army Engineers will not agree. The commission plans to finance the project through revenue bonds.

### State Owned Dams Recommended for Missouri

A State legislative committee studying Missouri's water problems recently was told by representatives of various interested groups that the State is far behind other states in water legislation, that a definite water policy should be established by law, and that administration should be put under a single State agency.

A system of multiple-purpose dams operated under State control also was recommended to the study

committee as a step toward solving the State's water problem. This proposal was made by Will Eakin, of Pacific, chairman of a St. Louis County committee which has been studying water problems in the Meramec Basin. He said a water authority should be at the State rather than the National level.

When benefits are measured against costs over a period of 20 years, Eakin said, multiple-purpose dams could be justified in meeting the watershed problem in the Meramec, Osage, Culvre, and other river basins.

Eakin warned the State legislative committee that Missouri is losing out industrially because it lacks laws to guard plant sites against floods on the one hand and to avoid water shortages in drought years on the other.

### Zahorski's New Structural Sandwich Construction

Zahorski Engineering, Inc., of Santa Barbara, Calif., has developed a new, low-cost structural sandwich construction called Plyweb for elevated temperature applications. Its uses include aircraft and missile primary structure, wings and fuselage, integral fuel tanks, and a wide variety of other commercial and industrial applications.

Plyweb consists of two separate structural halves which, when they are joined, form a complete sandwich plate. The manufacture of each separate half-section is accomplished with production-line techniques and standard equipment. Fastening of the sandwich core to its facing plate, to produce a half-section, is done by seam welding, spot welding, riveting, or other standard fastening methods. Bonding of the half-sections to form the complete sandwich plate is done metallurgically, chemically, or mechanically, depending on the functional requirements of the project.

The completed sandwich structure is capable of carrying both compression and bending loads in two directions. The plate girder and Warren truss type of construction also enable it to carry shear loads effectively.

This structural sandwich can be manufactured in a variety of materials such as stainless steel, titanium, aluminum, magnesium, fiberglass, or any combination of materials necessary to maintain structural integrity at any temperature range — high or low.

The individual ducts that go to make up the core can be sealed and used to insulate the structure, to circulate coolants, or to preheat fuels or fluids.

Zahorski Engineering, Inc., has successfully engaged in research and development in the fields of structures and mechanics for both the government and the aviation industry. Its function is the solution of unorthodox temperature problems.

You can make concrete water repellent before you pour so why use time-consuming after-drying coatings? Simply add Horn Hydratite® to the mix. It creates internal chemical changes—lines the pores—resulting in water repellency and resistance to moisture penetration. It also minimizes the danger of freezing and subsequent cracking or spalling.

Horn Hydratite can be added to concrete, stucco and cement plaster mixes. It is available in either powder or liquid, both of which are equally effective in forming an internal barrier against water penetration.

Like to know more about the Hydratites? For details; Write: Dept. H55-229.



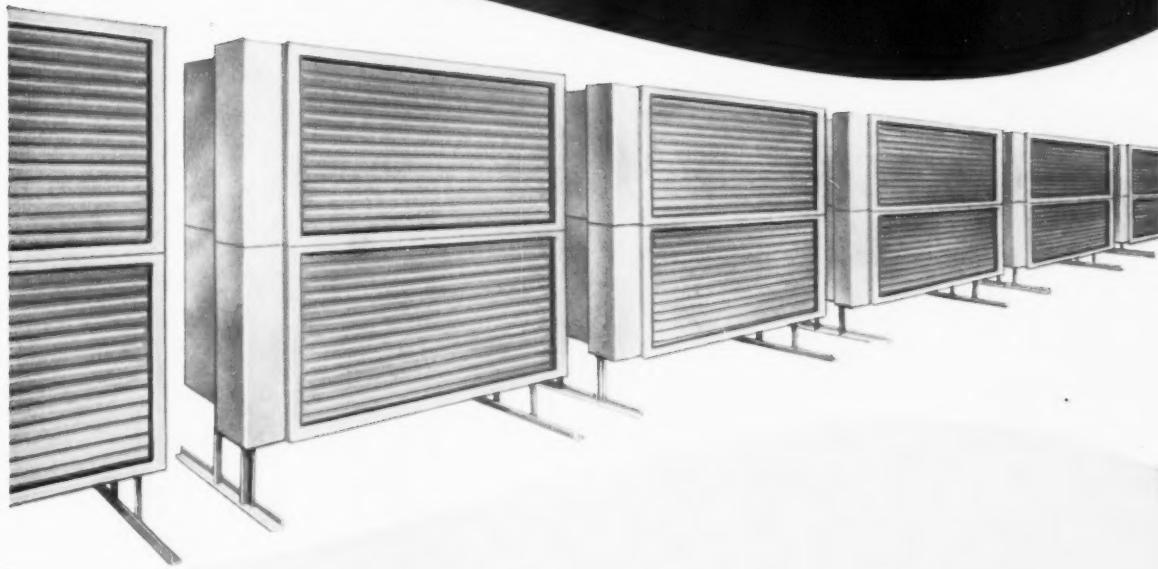
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Kramer Unicon has brought a new era into the industry. With more than 20 years of unique practical experience and know-how in dry condensing, Kramer again offers new avenues of opportunity to the air conditioning and refrigeration industry.

Unicon now has no capacity limit. Standard Unicon systems up to 540 tons are now cataloged for the first time.

Unicons for heat pump applications are now also available with no horsepower limitations.

Kramer engineering and design has proven that the Unicon can move large volumes of air with extreme quietness.

Unicon has long proven by actual experience that it is free from fouling or corrosion and requires practically no maintenance.

The total operating weight per ton for Unicon is very low, resulting in minimum platform and reinforcement requirements.

Unicon space requirements are surprisingly small; a 300 ton system requires only 15' x 14' floor space and is 12' high.

WRITE FOR BULLETIN U-391

**KRAMER TRENTON CO. • Trenton 5, N.J.**

44 YEARS OF CONTINUOUS ACHIEVEMENT IN HEAT TRANSFER

# New from DAY-BRITE...



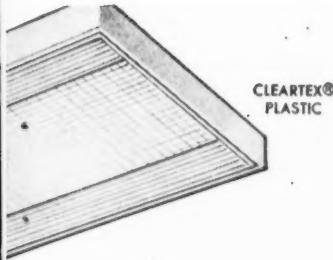
Daylume® makes the most of the merchandise in the Berglund Edsel showroom, Camden, N. J. F. HERBERT RADEY, A.I.A., Architect.  
JOHN T. PLASKET, INC., Electrical Contractors.



## Quick facts about **DAYLUME** for Engineers

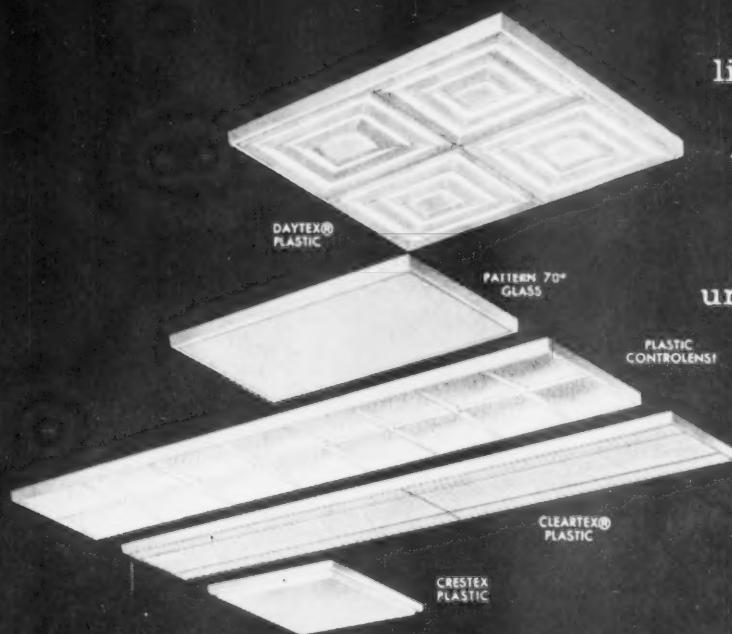
**DAYLUME WAS DESIGNED** to meet contemporary architecture's needs for surface-mounted lighting elements offering *thinner profile, cleaner lines, lighter weight, and stronger construction* . . . to complement the "sleek surface" look in modern stores, offices, schools, and institutions. Recessed back plate design assures snug alignment with ceiling.

**TO SIMPLIFY PLANS** the Daylume series is available in six sizes: 1' x 4', 1' x 8', 2' x 2', 2' x 4', 2' x 8' and 4' x 4' in two-, four-, and eight-lamp arrangements of two- or four-foot lamps. Placement is not restricted by structural or mechanical components. Enclosures may be hinged from either side.



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## Surface Lighting Elements



Open new opportunities in lighting effects and effectiveness.

Combine recessed appearance with surface-mounted flexibility.

Only 3½ inches thin for today's lower ceilings. Available in an unusual variety of enclosures and sizes for extraordinary light control and layout possibilities. All this plus Day-Brite quality—the standard of the industry!

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† © Holophane Co., Inc.

Can be wired through sides, centers or ends for end-to-end, side-by-side, or end-to-side installation. Equipped with separately fused CBM ballasts.

**COMBINE WITH RECESSED LIGHTING.** In addition to those shown, enclosing materials include glass and other plastic elements. For recessed lighting to match and combine with these enclosures, specify Day-Brite Mobilex®, Troffers and 4-Square fixtures.

**FOR FREE ILLUSTRATED BOOKLET** on Daylume, call your Day-Brite representative listed in the Yellow Pages. Or write Day-Brite.

Z-76

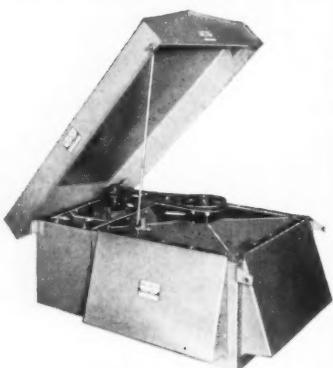
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**DAY-BRITE**  
*Lighting Fixtures*

AirMepeler

## LO-BOY CENTRIFUGAL ROOF EXHAUSTERS

**Enhance The Beauty  
Of Building Skylines**



Pats.  
Pend.

### Lowest Silhouette Design FORWARD OR BACKWARD CURVE WHEEL WITHIN . . . OR OUT OF SCROLL HOUSING

Motor mounting on side of structure support . . . out of line of air stream reduces height of Lo-Boy models nearly 50% of older designs.

LOW WIND RESISTANCE SIZES 10"-72"  
600-47,000 CERTIFIED C.F.M. RATINGS

- QUALITY
- BEAUTY
- PROVEN PERFORMANCE

See Sweet's File 20c/Amm or  
Write for bulletin CE100 57

**AMMERMAN CO., INC.**

110 North Second St.  
Minneapolis 1, Minnesota  
MEMBER OF THE AIR MOVING &  
CONDITIONING ASSN.



# Men in Engineering

chief purchasing engineer has assumed promotional and special assignments. He has been succeeded by J. J. Cuniffe.

D. C. Hormell, vice president and chief engineer, has become vice president and consulting engineer and is succeeded by Carl R. Barthelemy. L. J. Booth, mechanical engineer, has become chief mechanical engineer, replacing Mr. Barthelemy.

H. L. Hoeppner, chief electrical engineer, has been appointed consulting electrical engineer. W. F. Bergmann, senior electrical engineer, has assumed Mr. Hoeppner's former duties.

L. M. Davis has been elected a vice president with the title vice president and chief structural engineer.

O. B. Schier, II, has been appointed secretary of The American Society of Mechanical Engineers. He succeeds Clarence E. Davies who was secretary of ASME for 23 years.

The American Society of Mechanical Engineers has named thirteen members as Fellows of the Society. They are: Richard G. Folsom, professor of mechanical engineering, University of Michigan; Albert N. Horne, vice president and general manager of the Texaco-Cities Service Pipe Line Co.; Jerome J. Kanter, director of engineering research and development at the Crane Co., Chicago; Myron A. Kendall, chairman of the board of directors of the Stephens-Adamson

Mfg. Co., Aurora, Ill.; Harold E. Martin, president of Metal and Thermit Corp.; Harold B. Maynard, president, Methods Engineering Council; Gordon R. Milne, chief mechanical engineer, Consolidated Edison Company of New York; Arthur H. Morey, supervisor of advance engineering, General Electric Co., Erie, Pa.; Arthur M. Perrin, president, National Conveyors Co., Fairview, N. J.; George A. Porter, vice president in charge of engineering, construction, and operations, Detroit Edison Co.; J. Kenneth Salisbury, consulting engineer; Harold S. Sizer, director of design for machine tools, Brown and Sharpe Mfg. Co., Providence, R.I.; and Ronald B. Smith, operating vice president, M. W. Kellogg Co., New York City, New York.

Captain Arthur I. Flaherty (Civil Engineer Corps), U.S. Navy Retired, an officer of the firm of John A. Blume & Associates, Engineers, San Francisco, has been appointed executive secretary of the Board of Registration for Civil and Professional Engineers of the State of California. He succeeds J. Douglass Locke in this position.



FLAHERTY

ANDERSON

Keith E. Anderson, consulting engineer-geologist, has opened offices at 6932 Westfield Place, Boise, Idaho. The firm will specialize in groundwater, drainage, and irrigation problems. Anderson was formerly regional drainage and groundwater engineer for the Bureau of Reclamation in the Pacific Northwest.

Dr. D. B. Steinman, Consulting Engineer, New York, has been selected by the government of Turkey as the engineer to design and supervise the construction of a \$50 million suspension bridge across the Bosphorus at Istanbul.

At the Joint Annual Convention of the American Institute of Architects and the Professional Engineers, held in Roanoke, Va., Professor Herbert Manuccia of the Catholic University of America, Washington, D.C., received a citation as Engineer of the Year of the State of Virginia. The award is given yearly to the outstanding engineer in the State based on his efforts on behalf of the engineering profession and professional societies, type of work performed, service to the community, and activity in his church.

In recognition for his outstanding work in heating, ventilating, cooling, and air-conditioning, George Lewis Tuve, professor of mechanical engineering and director of Bingham Laboratories, Case Institute of Technology, Cleveland, Ohio, has been named to receive the 16th award of the F. Paul Anderson Medal from the American Society of Heating and Air-Conditioning Engineers.

A new firm, Design Art Corp., has been formed with offices at 60 E. 56th St., New York City and 2905 Vernon Place, Cincinnati, Ohio. Officers are: Charles H. Burchard, president and A. M. Kinney, Jr. and J. M. Christie, vice presidents. A. C. Crockett has been appointed design director. Affiliated with A. M. Kinney, Inc., consulting engineers, the firm will offer decorating and product design services.

A new company, Chempro, Inc., has been formed with offices in the Plaza Building, Pittsburgh, Pa. Dr. J. A. Patterson and Carl Labovitz are engineers and associate executives of the firm. Specializing in chemical processes

# Atlas

## PLANT-WIDE PROTECTION STOPS CORROSION!



### ATLAS CORROSION-PROOF CEMENTS

... complete line of sulfur silicate and resin based cements for plant-wide use in constructing corrosion-proof tanks, floors, pits, trenches and sumps.

### ATLAS CORROSION-PROOF TANK LININGS



... natural or synthetic rubber and asphaltic materials designed to meet specific corrosive conditions within your plant and installed at the job site or in Atlas shops.



### ATLAS RIGID PLASTIC STRUCTURES

... corrosion-proof, self supporting polyvinyl chloride designed and fabricated for use as tanks, ducts and fume systems to meet your exact needs ... plastic pipe systems to convey all your corrosives.

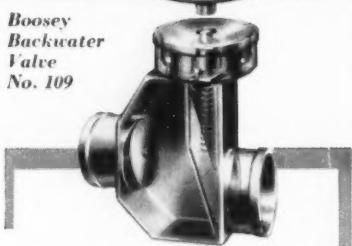
These products will give you permanent plant-wide protection against corrosives.

Write for Bulletin CC-3.

**ATLAS**  
**MINERAL**  
PRODUCT COMPANY  
MERTZTOWN, PENNSYLVANIA

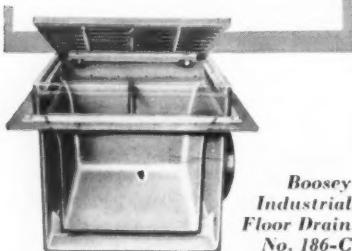
**ONLY BOOSEY  
GIVES YOU  
CUSTOM  
DRAIN DESIGN  
AT COMPETITIVE  
COSTS**

Boosey  
Backwater  
Valve  
No. 109



The Boosey line of drains offers over 4000 product variations—400 design options for floor drains alone. You can literally design your own drain from these variations.

Boosey drains have proven their dependability in thousands of buildings for nearly fifty years. You'll find you can specify the exact drain for the job easily, quickly, with the Boosey Catalog. If you don't have one write for it today—on your letterhead please.



EN-581

**NORMAN BOOSEY MFG. CO.**  
General Sales Office  
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EN-581

**BOOSEY**

for industry, the firm also will do general engineering and consulting work.

Dr. Patterson merged his existing consulting firm, J. A. Patterson Engineering Consultants, in the new company. Labovitz was formerly with The Rust Engineering Co.

Paul Zoffmann, chemical engineer, has been appointed technical director of Sam Tour & Co., Inc. and its affiliate, The American Standards Testing Bureau, Inc. Mr. Zoffmann will supervise the chemical and metallurgical laboratories and coordinate the chemical and metallurgical activities of these two organizations. Zoffmann formerly was engaged in analytical work in water-chemistry and metallurgy.

The American Institute of Chemical Engineers elected 1958 officers at its annual meeting in Chicago. They are: president, Dr. George E. Holbrook, E. I. du Pont de Nemours & Co.; vice president, Dr. Donald L. Katz, University of Michigan; treasurer, Dr. J. Henry Rushton, Purdue University; and secretary, F. J. Van Antwerpen. Directors elected for terms of three years are: Dr. E. R. Gilliland, Massachusetts Institute of Technology; Dr. John J. McKetta, *Petroleum Refiner*; Raymond R. Generaux, E. I. du Pont de Nemours & Co.; and H. F. Nolting, Standard Oil Co.

The American Society of Heating and Air-Conditioning Engineers, at a recent meeting of the Council of the Society, elected eight members as Fellows of the Society. They are: Albert L. Baum, Jaros, Baum & Bolles; the late Alfred C. Buensod, Buensod-Stacey, Inc.; Professor Carl F. Kayan, Columbia University, all of New York City; Irwin W. Cotton, Indianapolis, Ind.; Edward L. Crosby, Henry Adams, Inc., Baltimore, Md.; Edmund P. Heckel, E. P. Heckel & Assoc., Chicago, Ill.; Professor Emeritus

Frank B. Rowley, University of Minnesota, Minneapolis, Minn.; and George M. Simonson, San Francisco, Calif.

Edwin A. Doig has joined the firm of Smith, Hinchman & Grylls Associates, Inc., of Detroit, Mich. He will assist Adolf H. Roessling, head of SHG's hospital planning division, in the development of hospitals and selection of equipment. Mr. Doig was formerly with the Veterans Administration, in charge of hospital construction for this agency.

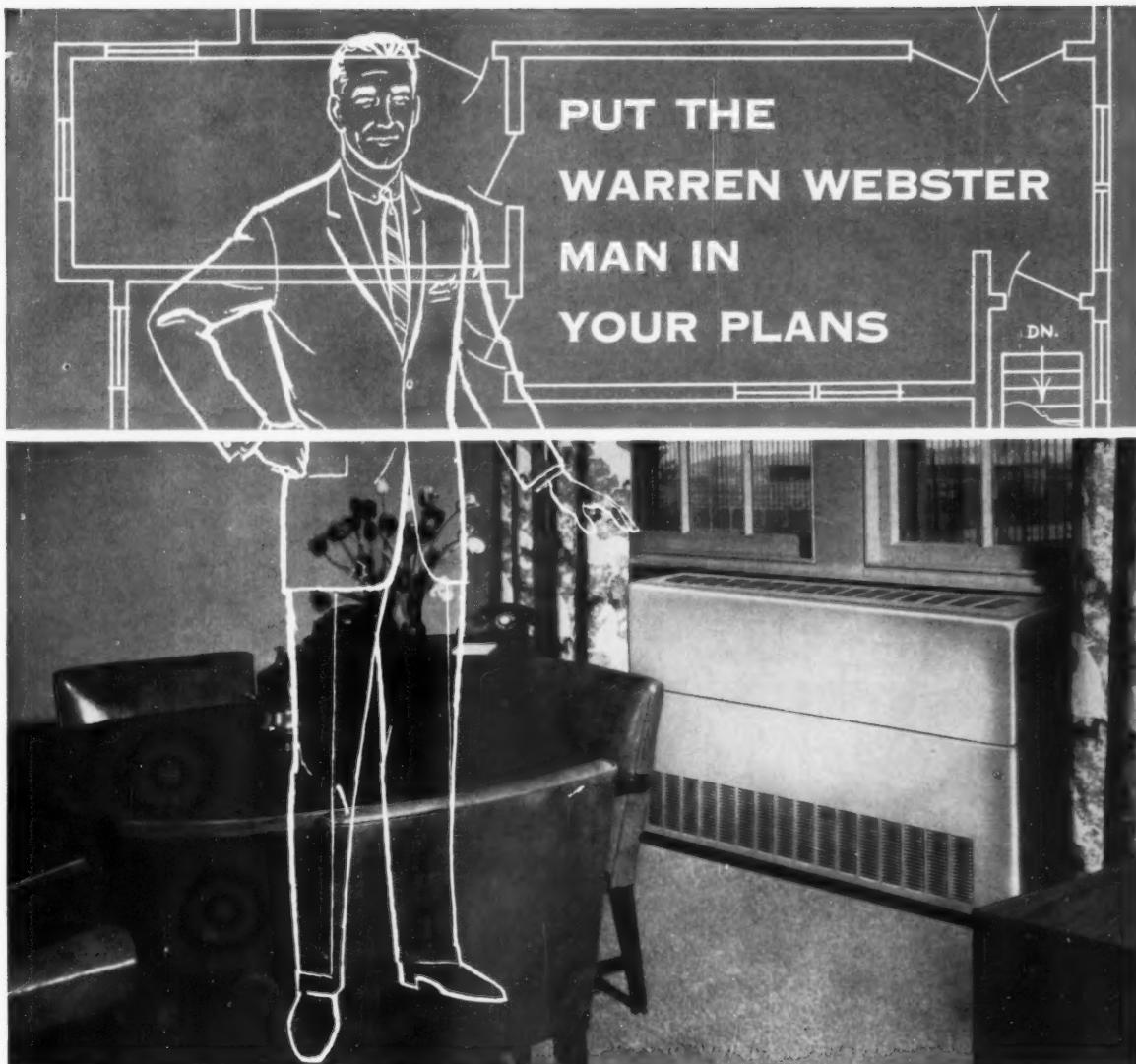


DOIG OLMSTEAD

Three members of the H. K. Ferguson Co., of Cleveland, Ohio, have been appointed to new positions. They are: Ralph W. Olmstead, executive vice president; James R. Fraser, vice president, engineering; and William E. Hark, vice president, construction.

Roger L. Conkling has joined the firm of H. Zinder & Associates, Inc., utility consultants and engineers. Located in the firm's Washington, D.C. office, Conkling will be engaged in projects relating to electric utilities and resources development, rural electrification systems, and natural gas matters. He was formerly assistant to the administrator, Bonneville Power Administration, U. S. Department of Interior.

Two new officers of the Hinchman Corp., of Detroit, Michigan, have been announced. They are: James D. Ghesquiere, chief engineer, director and, secretary and John A. Michelson, appointed as treasurer.



## Distinctive NEW Cabinet Heaters...Right for so many jobs!

It's here! It's NEW! It's the Deluxe Series Cabinet Heater line by Warren Webster, especially designed for modern HYDRONICS heating, for buildings of almost every type.

- 21 hot water ratings, 14 steam ratings
- Full range of cabinet styles
- Choice of draw-through, or blow-through models
- Heavy-gauge furniture steel cabinets finished in gray-green hammer-tone baked-on enamel for permanent, scuff-free beauty

For complete details on this exciting new line of Webster Cabinet Heaters — and the all-new matching Deluxe Series Cabinet Air Conditioners — see your Warren Webster Man, or write for Bulletins B-1740 and B-1750. Warren Webster & Company, Camden 5, New Jersey. Since 1888. Offices in principal U.S. cities and Canada.

WEBSTER'S  
FINEST  
PRODUCT



*the Warren Webster Man*

**WARREN WEBSTER**  
HEATING . . . COOLING

**WOOD  
is better for  
many jobs**

**BECAUSE**

- Wood is resistant to chemicals.
- Wood can't rust or corrode.
- Wood has long life.
- Wood requires little maintenance.

*Specify and use*

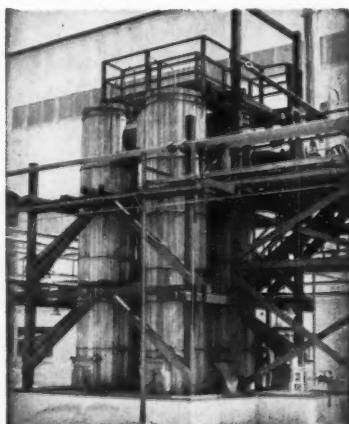
**WENDNAGEL**  
**"corrosion-resistant"**  
**WOOD TANKS**

For storage and handling  
of industrial wastes and chemicals.

**Battery of Sludge Filters — Wood parts were furnished by Wendnagel. Nothing will take the place of WOOD for long life and low maintenance.**



**Battery of Sludge Filters — Wood parts were furnished by Wendnagel. Nothing will take the place of WOOD for long life and low maintenance.**



**An example of Wendnagel engineering and construction for special applications — Multi-Stage Gas Scrubber for elimination of acid vapors and gases-furnished to requirements.**

**Send for new bulletin on use of Wood Tanks for chemicals.**

**Wendnagel & Co., Inc.**

610 W. Cermak Road  
Chicago 16, Ill.

# New Projects Reported

By Consulting Engineers —

## ARIZONA

**John A. Carollo, Consulting Engineers**

Phoenix, Arizona

Design and supervision of construction of sewers from Glendale, Ariz., to Glendale-Phoenix sewer. (civil) \$426,210. Client, City of Glendale.

Water works extension and improvements including 1 million gallon elevated storage tank. (civil) \$450,000. Client, City of Mesa, Ariz.

Sewerage improvements consisting of outfall sewer line, treatment plant, addition to collection system, and storm sewer system. (civil) \$400,000. Client, City of Winslow, Ariz.

Sewage disposal plant, Phoenix, Ariz. (civil) \$528,000. Client, City of Phoenix, Ariz.

Sewage treatment plant enlargement. (civil) \$1,360,000. Client, City of Tucson, Ariz.

Waterworks improvements. (civil) \$100,000. Client, City of Glendale.

## CALIFORNIA

**Francis E. Adams**

Los Gatos, California.

Willimar Lodge (motel), Tracy, Calif. 46 units and coffee shop. Plumbing, heating, air conditioning. (mech., elec.) \$90,000. Client, Marvin S. Knox, Arch., Los Gatos, Calif.

Stratford Arms Apartments, San Mateo, Calif. Plumbing, heating, ventilating. (mech.) \$350,000. Client, Allan M. Walter and Assoc., Arch., San Jose, Calif.

**Dwight A. Coddington,  
Mech. Engineer**

San Francisco, California.

Chas. Albert Adams Junior High School, Richmond, Calif. First phase, 3 levels, comprised of 28 classrooms, administration area, cafeteria-kitchen, library, and locker rooms. (mech.) \$1,200,000 (total) Client, John Carl Warnecke, AIA.

**Dr. J. J. Polivka, Consulting Engineer**  
Berkeley, California

6-story building for elderly and retired people, Berkeley, Calif. (struc.)

\$600,000. Client, Norris Gaddis, Arch., Oakland, Calif.

Research laboratory building for Diablo Laboratories, Inc. (civil, struc., mech., elec.) \$60,000.

**Levine & McCann**

Los Angeles, California

Stonewood shopping center, Downey, Calif. (mech., elec.) \$40 million. Client, Jacobson, Coppedge, Huxley.

John Jay Hopkins laboratory, San Diego, Calif. (mech., elec.) \$3 million. Client, Pereira & Luckman, Arch.

**John A. Carollo, Consulting Engineers**  
Phoenix, Arizona

Sewerage improvements including treatment plant and trunk sewers. (civil) \$2,250,000. Client, City of Riverside, Calif.

Design and general supervision of sewage disposal facilities, Orange County, Calif., including 66-in. pipeline and headworks. (civil) \$1,336,000. Client, Orange County Sanitation Districts, Santa Ana, Calif.

## COLORADO

**Ripple and Howe**

Denver, Colorado

Sewage treatment plant expansion. (civil) \$470,000. Client, North Washington Street Water & Sanitation District, Welby, Colo.

Sewage treatment plant. (civil) \$400,000. Client, City of Littleton, Colo.

**Ken R. White**

Denver, Colorado.

Colfax and Federal Avenues interchange, Denver, Colo. Overpass structure, with all ramps, structures, surfacing, and lighting. \$2,500,000 total (construction \$1,250,000, right of way, \$1,250,000) Client, Colorado State Department of Highways.

Trinidad Freeway, Trinidad, Colo. Approximately 3½ miles of urban 2-lane roadway, 5 interchanges, grade separations, and 7 structures complete. \$4,000,000. Client, Colorado State Department of Highways.

**THE KVP COMPANY**

Manufacturers of  
Concretes and  
Cements  
KALAMAZOO, MICHIGAN TEL. Elkhorn 4-2581

September 30, 1957

Mr. C. A. Bodertberg  
District Manager  
Combustion Engineering, Inc.  
1537 Beek Building  
Detroit 26, Michigan

Dear Mr. Bodertberg:

Nineteen months ago we placed boiler No. 9 in service. Since No. 9 is a C-E boiler, we thought you might be interested in the following information.

The paper industry is highly competitive and a difference of a fraction of a cent per pound of paper often means the difference between selling and not selling a customer. When it is considered that 11% of the manufacturing cost of our paper is power cost, it can be seen that any reduction in power cost has a real influence on the cost of the paper produced.

The installation of No. 9 boiler has contributed to reducing power costs in several ways:

- INCREASED EFFICIENCY**

Boiler No. 9 replaced three existing boilers having an average efficiency of 74% with one boiler having an efficiency of 87.2%.

- REDUCTION IN FUEL COST**

The three boilers replaced required coal having an ash fusion temperature above 2000 degrees F., whereas in No. 9 furnace we have burned, with no difficulty, and having an ash fusion of 2100 degrees F. The ability of the boiler to use such coals opens up sources of coal supply otherwise unusable for our use, but which are now economically attractive.

- LOW MAINTENANCE AND HIGH AVAILABILITY**

Maintenance costs to date have been very low. The boiler has been in operation sixteen months and the only outage for repairs occurred

KALAMAZOO, MICHIGAN DEON, PENNSYLVANIA HUSTON, TEXAS STURGIS, MICHIGAN ASSOCIATED COMPANIES OF THE KALAMAZOO VEGETABLE FARMING COMPANY THE KVP COMPANY LIMITED, Etobicoke, Ontario APPLIED PAPER PRODUCTS LIMITED, Hamilton, Ontario and Montreal, Quebec

Plants at

Mr. C. A. Bodertberg  
Combustion Engineering, Inc.

September 30, 1957

shortly after the unit was put in operation, when root blower misalignment caused cutting of several tubes. Fortunately, this occurred at the end of the week when the boiler was taken off the line for a scheduled outage and our own maintenance crew made temporary repairs by seal welding the cuts. Shortly after, Combustion, at their own expense, replaced sections in all damaged tubes during a scheduled Sunday outage. This work required about eight hours and no production time was lost.

Each of the two pulverizers has handled over 50,000 tons of coal without maintenance other than minor adjustments.

(d) **LITERAL BOILER DESIGN**

The ability of the boiler to handle sudden increases in load was demonstrated when it was called upon to pick up the load of one of the other boilers which was tripped off the line due to mechanical equipment failure. At that time No. 9 boiler output increased from 174,000 lbs. per hour to 234,000 lbs. per hour without difficulty and without interruption to manufacturing production. This load was 30% above the maximum continuous rating for which the boiler was designed. It may be of further interest to you to know that the literal design of the boiler permits it to carry a load in excess of the above, the limiting factor being the capacity of the feed water valve.

As you may gather from the above, we are greatly pleased with this installation.

Sincerely yours,

THE KVP COMPANY

*Ed*

Edward A. Wenz  
Project Manager

# You'll want to read this letter...

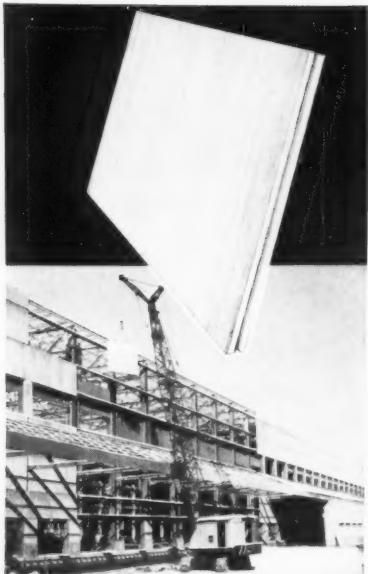
... if you're going to be in the market for boilers in '58!

C-E offers a type and size of boiler for every steam requirement — from 4,000 to 4,000,000 pounds per hour — and recently was awarded a contract for a boiler in the latter size class which will be the biggest boiler ever built.

**COMBUSTION ENGINEERING** 

Combustion Engineering Bldg., 200 Madison Ave., New York 16, N. Y.

ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; SOIL PIPE.



**no winter weather slow-ups when you build with**

## MARIETTA CONCRETE WALL PANELS

Construction moves ahead right on schedule, regardless of weather, when Marietta precast concrete wall panels are used for curtain walls.

Marietta insulated wall panels are only 5 inches thick . . . yet their insulation value is greater than a 12 inch masonry wall. This savings in wall thickness adds valuable floor space.

Panels come in a variety of standard size units and are equipped with metal inserts for bolting directly to structural framework or floor. Interlocking joint forms a weather-proof seal. No costly, time-consuming masonry work . . . no cold weather delays.

The broomed, or colorful exposed aggregate finishes create pleasing architectural effects for any structure. In winter building, or any other season, you'll realize major construction economies through use of Marietta precast wall panels.

Write for information and advice on the use of Marietta wall panels, structural units and custom prestressed components.

**BRANCH OFFICES:** Baltimore 21, Md.; Charlotte 6, N. C., Nashville, Tenn., Jamestown, N. Y.



## FLORIDA

**George L. Cadenhead**  
Fort Lauderdale, Florida.  
First Baptist Church, Delray, Fla.  
\$400,000. Client, C. Stewart, Arch.

Airport terminal building, Broward County, Fla. \$367,000. Client, George Storrs, Arch.

Police station and jail, Fort Lauderdale, Fla. \$600,000. Client, Wm. Bigoney, John Evans, Arch.

**Col. A. B. Jones, USA (Ret.)**  
Miami Beach, Florida  
Represent various navigation interests before U. S. District Engineer, Jacksonville District, in opposition to issuance of permit by Florida State Road Department for construction of bridge over Miami River, Fla.

**Hardesty & Hanover**  
New York, New York  
Design of Hanover skew bascule bridge over Boca Raton inlet, Palm Beach County, Fla. (struc.) \$400,000. Client, State Road Department.

**Beiswenger, Hoch & Associates**  
Jacksonville, Florida  
U.S. post office and court house, Jacksonville, Fla., air conditioning. (mech.) \$950,000. Client, General Services Administration.

Jet engine maintenance shop, Cecil Field, Fla., advance planning. (civil, struc., mech., elec.) \$1,700,000. Client, U.S. Navy.

Storage and transit warehouse N.A. A.S. Mayport, Fla., advance planning. (civil, struc., mech., elec.) \$385,000. Client, U.S. Navy.

Enlarging Florida Highway A-1-A to four lanes, Neptune Beach and Jacksonville Beach, Fla. (civil) \$900,000. Client, State Road Department.

**James A. Tuck**  
Ft. Pierce, Florida  
Shopping center, 175,000 sq ft, Ft. Pierce, Fla. \$1,500,000. Client, Enterprises, Inc.

## GEORGIA

**Dean Engineering Company**  
Albany, Georgia  
Waterworks improvements. New well, main extensions, distribution, and plant improvements. Sewer improvements, lift station, and sewer extensions. \$100,000. Client, City of Camilla, Ga.

Waterworks improvements, main extensions, etc. \$25,000. Client, City of Coolidge, Ga.

Report on utilities, water, sewer, gas, steam, boilers, conversion to gas-oil, new boiler, etc. \$150,000. Client, Valdosta State College, Valdosta, Ga.

## IDAHO

**R. D. Stoker**  
Soda Springs, Idaho  
Federal aid secondary road, 5 miles, relocation, including one 100-ft bridge. Riverdale section of the Mink Creek Road. \$200,000. Client, Franklin County, Idaho.

## ILLINOIS

**Wald & Zigas**  
Long Island City, New York  
Winston Park Plaza Shopping Center, Melrose Park, Ill. 50-acre site, 500,000-sq-ft floor area. (mech., elec.) \$7,500,000. Client, Erwin Serber, Arch.

## INDIANA

**J. Stephen Watkins,**  
**Consulting Engineers**  
Lexington, Kentucky  
Design and contract plans for 5.5 miles of interstate system near Anderson, Ind. (civil, struc.) \$5,500,000. Client, State Highway Department of Indiana.

**Fink, Roberts & Petrie**  
Indianapolis, Indiana  
Manufacturing building. (arch., civil, struc.) \$2,000,000. Client, Link Belt Co., Indianapolis, Ind.

Music building, Indiana University, Bloomington, Ind. (struc.) \$3,500,000. Client, Daggett, Naegele & Daggett.

Addition to Dental School, Indiana University, Indianapolis, Ind. (struc.) \$1,000,000. Client, Daggett, Naegele & Daggett.

Bridge crane installation and remodeling of crane aisle. (arch., civil) \$120,000. Client, Peerless Pump Division of the Food Machinery and Chemical Corporation.

## KANSAS

**Allgeier, Martin & Associates**  
Joplin, Missouri  
Sewage collecting system improvements. \$50,000. Client, Columbus, Kansas.

**Uri Seiden & Associates**  
Kansas City, Missouri  
Two grade schools for Johnson County, Kans. Steel framing. \$450,000. Client, Frangkiser & Hutchens, Arch.

## KENTUCKY

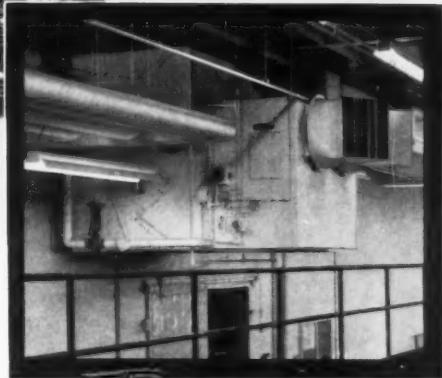
**J. Stephen Watkins,**  
**Consulting Engineers**  
Lexington, Kentucky  
Location, survey, design, and contract plans for 20 miles of interstate system between Sadieville and Williamstown, Ky. (civil, struc.) \$16,000,000. Client, Department of Highways, Commonwealth of Kentucky.



New Johnson & Johnson Plant at North Brunswick, N.J.

*Engineers and Builders:* Walter Kidde Contractors, Inc.  
*Mechanical Contractor:* Richardson Engineering Co.  
*Sheet Metal Contractor:* Middlesex Sheet Metal Co., Inc.

*At right: "Buffalo" Zone Unit Heater of the type used throughout this new plant.*



## **WORLD'S NEWEST AND LARGEST SURGICAL DRESSINGS PLANT UTILIZES OVER 150 "BUFFALO" AIR HANDLING UNITS**

Johnson & Johnson's ultra-modern Eastern Surgical Dressings Plant features many miracles of the automation age... ranging from a mile-and-a-half-long electronically-controlled automatic conveyor system to 23 four-way push button operated loading docks. Pre-planned plant expansion permits enlargement of the three major buildings in six directions without disturbing present production operations.

In such a modern plant, as carefully planned for tomorrow's expansion needs as for today's efficiency standards, it is natural to find "Buffalo" Air Handling Equipment.

Over 150 "Buffalo" Heaters, Central System Air Conditioning Units and Ventilating Fans provide all atmospheric control.

In addition to heating and ventilating requirements, this includes air conditioning in all offices, the cafeteria and sections of the manufacturing area where the conditions demand its use.

Over 81 years of engineering experience, plus modern-as-tomorrow design, insure the efficiency and economy of every "Buffalo" installation. Whatever your air conditioning, heating, ventilating or air cleaning problem, contact your nearest "Buffalo" representative, or write us direct for full information.

Engineered into every "Buffalo" product is the "Q" Factor —the built-in Quality which provides trouble-free satisfaction and long life.



**BUFFALO FORGE COMPANY**

BUFFALO, N.Y.

*Canadian Blower & Forge Co., Ltd., Kitchener, Ont.*

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING

**ENTERTAINED**

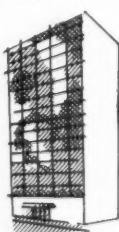
**LOOP  
HOTEL  
ROOMS**  
*anytime to*  
**PREFERRED  
GUESTS \***

\* During certain convention periods, all available Chicago hotel rooms are frequently taken. You can be assured of comfortable accommodations in the heart of the Loop, anytime, by writing for your FREE "Preferred Guest Card" from the Hotel Hamilton, today. The Hamilton — preferred by the family, and business executives for downtown convenience and courteous hospitality at sensible rates—guarantees (with advance notice) reservations anytime of the year to you, the preferred guest. Ask for your "Preferred Guest Card", today at no obligation.

**■THE LITTLE  
SQUARE**  
**Chicago's newest  
restaurant and  
lounge**

**H THE  
NEW**

**HAMILTON  
HOTEL**  
20 SOUTH DEARBORN  
*"Preferred by guests in*  
**CHICAGO"**



Location, survey, design, and contract plans for 2.75-mile relief route, Versailles, Ky. (civil, struc.) \$1,000,000. Client, Department of Highways, Commonwealth of Kentucky.

#### LOUISIANA

##### E. M. Freeman & Associates

Shreveport, Louisiana.

Junior high school, project No. 39, Shreveport. (struc.) \$700,000. Client, J. Sheshire Peyton & Assoc., Arch. Post office building, Jonesboro, La. (struc.) \$300,000. Client, Bodman, Murrell and Smith, Arch.

##### Albert G. Bear, Specifications Consultant

New Orleans, Louisiana

Roosevelt motel and garage, New Orleans, La. Jos. E. Leinenger & Assoc., mechanical and electrical consultant. \$2,500,000. Client, Diboll-Kessels & Assoc., Arch.

St. Mary's Dominican College, New Orleans, La. Jos. E. Leinenger & Assoc., mechanical and electrical consultant. \$750,000. Client, Diboll-Kessels & Assoc., Arch.

Wego shopping center, Westwego, La. Jos. E. Leinenger & Assoc., mechanical and electrical consultant. \$500,000. Client, Diboll-Kessels & Assoc., Arch.

#### MARYLAND

##### Silver Associates

Towson Plaza Shopping Center, 160,000 sq ft, air conditioning, heating, ventilating, and plumbing. Towson, Md. (mech., elec.) \$1 million. Client, Leavitt Associates, Architects and Engineers.

#### MICHIGAN

##### Wesley Bintz, P.E.

Lansing, Michigan.

Concrete block building, 26-x 44-ft with basement and 12-x 16-ft lobby. (struc.) \$18,000. Client, Township of Caledonia, Paul Taylor, Supervisor, Owosso, Mich.

##### J. Stephen Watkins, Lexington, Kentucky

Survey, design, and contract plans for approximately 11 miles of primary highway, vicinity of Olivet and Charlotte, Mich. (civil, struc.) \$6,000,000. Client, Michigan State Highway Department.

##### Arthur H. Leach Bridgeport, Michigan.

Prepare plans and specifications for Neaton-St. Clair County drain, starting with installation of new culvert under Grand Trunk RR and crossing

M21. Client, Ted Leach, St. Clair County Drain Commissioner, Port Huron, Mich.

Prepare plans and specifications for Dutt and Hart County drain. Inter-county drain between Isabella and Midland Counties. Client, John Hudson, Chief of Drains, Michigan Department of Agriculture, Lansing.

##### Angelo J. Marino

Monroe, Michigan.

Complete sewer system and disposal plant in process of design for approximately 7000 population. Client, Village of Carleton, Mich.

#### MINNESOTA

##### Harold S. Hall

Alexandria, Minnesota.

Storm sewers and street improvements. \$500,000. Client, Wheaton.

#### MISSISSIPPI

##### Michael Baker, Jr., Inc.

Jackson, Mississippi.

Engineering services relative to development of Bayou Casotte industrial area in vicinity of Pascagoula, Miss. (civil) \$2,000,000. Client, Jackson County Board of Supervisors, Jackson County, Miss.

Engineering services relative to construction of artificial lake for industrial water supply. Hinds County, Miss. (civil) \$1,500,000. Client, Sixteenth Section Development Corp., Jackson, Miss.

#### MISSOURI

##### Williamson & Associates

St. Louis, Missouri

Sanitary sewer system and sewage lagoon. Preliminary plans and report in progress, including water works improvements. (civil) \$250,000. Client, City of Gideon, Mo.

Continuing contract for second year — special consultant for City of St. Louis on local Federal flood control project, on non-federal costs. (civil) \$7,600,000. Client, City of St. Louis.

##### Allgeier, Martin & Associates Joplin, Missouri

Sewage collecting system and sewage treatment facility. \$300,000. Client, Mt. Grove, Mo.

Sewage collecting system and sewage treatment facility. \$200,000. Client, Oran, Mo.

Water distribution and storage facilities. \$150,000. Client, Pleasant Hill.

##### Smith & Tao

St. Louis, Missouri

Swimming pool and bathhouse, St.

# Growing need for CAT standby power means more ways to serve your client



A 175 KW Cat Electric Set takes over within seconds if commercial power fails at Baptist Memorial Hospital, Jacksonville, Fla. Emer-

gency generator handles 35% of normal load including boiler, 12 operating rooms, 2 elevators and electric facilities for 300 beds.

Dependable CAT\* Diesel Electric Sets give emergency power protection in installations *big or small*. And increased acceptance of standby power gives architects and consulting engineers a sound opportunity to serve clients better.

Many businesses need emergency power—hospitals, hotels, banks, radio and TV broadcasting facilities, processing industries, airports (including structural additions) and shopping centers.

Your client may assume that your design will include standby power. Or, he may not have considered protection against power failure and will be impressed with your foresight in designing his facility to include a Caterpillar\* diesel generator. Either way, you do a more complete job by protecting your client against costly power failure.

Engine Division, Caterpillar Tractor Co., Peoria, Ill., U.S.A.  
\*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.



Two Cat D397 Electric Sets, capacity 600 KW, protect this mammoth refrigerated vault of Food Fair Stores in Miami. 70,000 sq. ft. of food storage serve 52 Food Fair Stores in the area. Without emergency power, disrupted power could be very costly.



A dependable Cat D375 Diesel Electric Set (approximate 190 KW) serves as standby for the 100,000-watt transmitter of WWJ-TV in Detroit. If commercial power fails, the standby unit insures against costly loss of programming time.

## BY CATERPILLAR

Dept. CR2, Engine Division  
CATERPILLAR TRACTOR CO., Peoria, Illinois, U. S. A.

Send me more information about Diesel Electric Sets for standby use in government, industry and public service applications.

- I am interested in learning more about these units in general.  
 I am interested in learning how to obtain government matching funds for purchase and installation of a Cat Emergency Power Unit.

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

# clean water

can be built into  
every swimming pool  
by specifying

*Hopkins*  
**FILTERS**

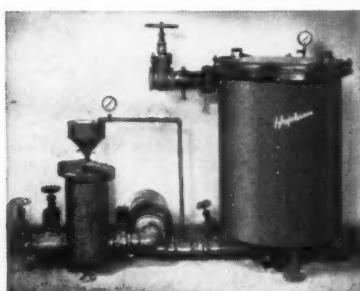
High efficiency with low operating costs—plus crystal clear swimming water—are the results of installing Hopkins FILTERMASTER Filters.

Diatomaceous earth, pressure-type models in sizes for all pools private and commercial. For full information and specifications write for Bulletin N-356. Engineering assistance also available.

#### HOPKINS EQUIPMENT COMPANY

Hatfield, Penna.

Filtration Specialists Over 30 Years



● Hopkins Model 32-22 Filtermaster with capacity up to 18,000 gals. per hr.

Genevieve, Mo. (elec.) \$100,000. Client, Erwin Schmidt, Arch.

Tucker dial building, St. Louis, Mo. (struc.) \$150,000. Client, Southwestern Bell Telephone Co.

Peace E. & R. Church, St. Louis County, Mo. (mech., elec.) \$100,000. Client, Manske & Diechmann, Arch.

Hanley Road Baptist Church, Clayton, Mo. (mech., elec.) \$250,000. Client, Fitch & Nicholas, Arch.

Shell Oil building, Clayton, Mo. (mech., elec.) \$1,000,000. Client, Erwin Schmidt, Arch.

Overland Christian Church, Overland, Mo. (struc., mech., elec.) \$150,000. Client, Manske & Diechmann, Architect.

#### NEBRASKA

##### Fulton & Cramer

Lincoln, Nebraska.

Sewage treatment, Blair, Nebr. \$75,000. Client, City.

Sewage treatment, Lexington, Nebr. \$300,000. Client, City.

Sewage treatment, Kimball, Nebr. \$90,000. Client, City.

Power plant, Plainview, Nebr. \$190,000. Client, City.

Power plant, Blair, Nebr. \$500,000. Client, City.

Power plant, Cambridge, Nebr. \$160,000. Client, City.

#### NEVADA

##### John A. Carollo, Consulting Engineers

Phoenix, Arizona

Cooling facilities for power plant, Whitney, Nev. (civil) \$200,000. Client, Southern Nevada Power Co.

#### NEW JERSEY

##### Engineers, Incorporated

Newark, New Jersey

Court yard building addition, truck docks, addition; office rebuilding, Newark, N.J. (civil, struc., mech., elec.) \$800,000. Client, Westinghouse Electric Corp.

Office and manufacturing building, Roseland, N.J. (civil, struc., mech., elec.) \$1,200,000. Client, Champlain Co., Inc.

#### NEW MEXICO

##### Dr. Marcello Giomi & Associates

Albuquerque, New Mexico.

R.E.A. building, Grants, N.M. Radiant heating and cooling in floor slab. (mech.) \$125,000. Client, Burwinkle & Milner, AIA.

Bataan Hospital addition, Albuquerque, N.M. High velocity air condi-

tioning, plumbing. (mech.) \$500,000. Client, Ferguson, Stevens & Assoc., AIA.

High school gymnasium and swimming pool, Jal, N. M. Heating, ventilating, plumbing. (mech.) \$550,000. Client, George Graves, AIA.

#### NEW YORK

##### Paul K. Gerhardt, P.E.

Union City, New Jersey.

Convent, Harrison, N.Y. (struc., mech., elec.) \$400,000. Client, A. J. DePace, Arch.

Doctors' hospital, Brooklyn, N.Y. (mech., elec.) \$1,000,000. Client, Mardar Associates.

Doctors' hospital, Bronx, N.Y. (mech., elec.) \$1,600,000. Client, A. J. DePace, Arch.

Inwood Country Club, air conditioning, Long Island. \$60,000. Client, Inwood Country Club.

##### Ralph M. Kendall, P.E.

Flushing, New York

Air conditioning. (mech.) \$30,000. Client, New York Medical College, Flower and Fifth Avenue Hospitals.

##### Otto J. & Warren A. Sambach

Williston Park, New York

Showroom, office, and factory, 100,000 sq ft, New Hyde Park N.Y. (civil, struc., arch.) \$750,000. Client, Gordon Properties, Inc. and Hanna Estates, Inc., owner-builder.

Office-storage, 50 x 126 ft, Flushing, N.Y. (civil, struc., arch.) \$50,000. Client, Queens Structure Corp.

##### Daniel Koffler and Associates

New Castle, Delaware.

Kingsbridge Heights Jewish Community Center, Bronx, N.Y. 3-story steel frame building with gymnasium, classrooms, ballroom, and chapel. (struc.) \$300,000. Client, H. I. Feldman, Architect, New York, New York.

#### NORTH CAROLINA

##### Ebasco Services, Inc.

New York, New York.

Supervise engineering and construction of chemical recovery unit for client. Client, Halifax Paper Co., Roanoke Rapids, N.C.

##### Wasell Engineering Service

Winston-Salem, North Carolina

Masonic Temple, High Point, N.C. (mech., elec.) \$210,000. Client, Wm. F. Freeman, Inc., Engineers & Architects, High Point, N.C.

Northside Shopping Center, Winston-Salem, N.C. (mech., elec.) \$1,400,000. Client, Fred W. Butner, Jr., Arch., Winston-Salem, N.C.

THE MARK OF QUALITY



# Electronic Control APPLICATIONS

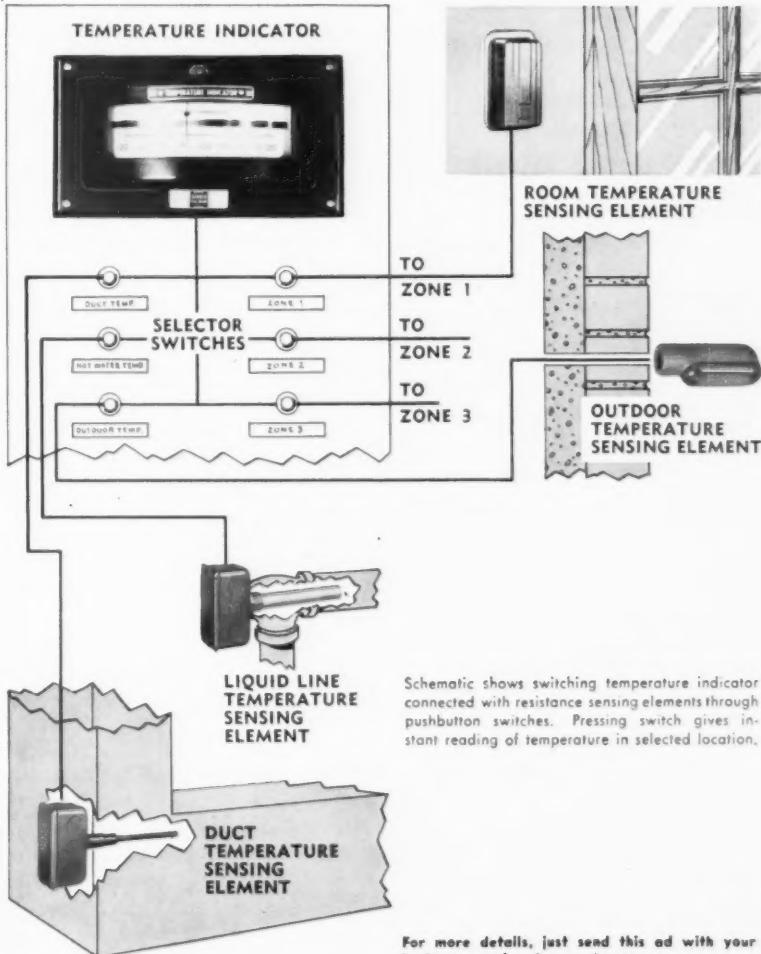
## New Electronic Resistance Thermometer centralizes temperature control

In commercial buildings, shopping centers, motels, etc., the new Barber-Colman Electronic Resistance Thermometer saves hours of labor by enabling the engineer or manager to make all temperature checks simply by pressing switches at one central point in the building. Wire-wound resistance elements sense temperature in individual rooms, zones, ducts, water lines, other selected points. Operating a labeled switch at the central panel gives reading from any point, on a switching temperature indicator.

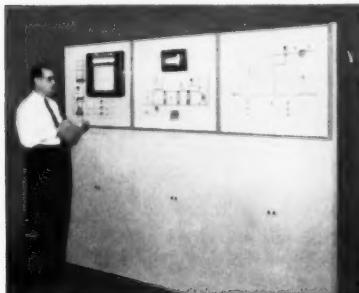
### Packaged Assembly

The Electronic Thermometer consists of an indicating meter, a bridge and power supply, and as many sensing elements and selector switches as are necessary to remotely check temperatures at all control points required for each application. Sensing elements are available in four types: room, duct, immersion, and outdoor. The Electronic Thermometer is easily adapted to either cabinet or panel mounting, depending on the type of application such as Electronic Control Centers, Component Identification Cabinets, etc.

**Permanently calibrated** — Extreme dependability of the thermometer is attributable to a unique power supply. Output to the bridge remains constant regardless of line voltage fluctuations, insuring permanent calibration.



Schematic shows switching temperature indicator connected with resistance sensing elements through pushbutton switches. Pressing switch gives instant reading of temperature in selected location.



(Left) Electronic Thermometer incorporated in a Barber-Colman Electronic Control Center. Such a center gives building engineer remote supervision and control of heating, cooling, and ventilating. For best results, specify combined Automatic Controls and Air Distribution by Barber-Colman.

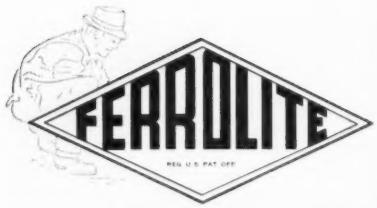
For more details, just send this ad with your business card — Data sheets F-7975 and F-8081 bring you up to date on important new Electronic Resistance Thermometers. Illustrated color brochure F-8031 gives features, advantages, and data on complete Barber-Colman Electronic Control Centers.



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## HEAVY DUTY ACID-PROOF FLOORS

FERROLITE is a very hard, yet resilient, acid and waterproof, jointless type of floor finish. FERROLITE can be installed over any type of solid base such as wood, concrete or brick and will withstand concentrated floor loads of over 600 lbs. per square inch without indentation. FERROLITE COLORS are Red, Brown, Gray and Black.

### ADVANTAGES —

FERROLITE Finishes are jointless, very homogeneous, easily kept clean, harden like stone and can be put into service 4 hours after installation. FERROLITE is elastic, resilient under foot, AND — it's ACID-PROOF. Also oil and grease proof FERROLITE is available.

### APPLICATIONS —

Both the acid-proof and standard FERROLITE Floor Finishes are especially suited for chemical plants, plating rooms, acid processing plants, food plants, paint and varnish plants, in fact wherever chemicals or acids or a combination of both create a flooring problem.

### INSTALLATION —

FERROLITE is installed in varying thicknesses of 1" up from thermo-regulated mobile power units especially designed in Europe and now available through Fulton in this country. All Fulton installations are made with our trained floor crews under our supervision which guarantees both quality of workmanship and uniformity of the finished product.



*Write, wire or phone today to*

**FULTON  
ASPHALT COMPANY**  
*Specialists since 1870 in quality floors*  
**165 W. WACKER DR., CHICAGO 1, ILL.**  
**PHONE: RA ndolph 6-1760**

**J. C. Harrison**  
Spartanburg, South Carolina  
Methodist Church. (mech.) \$256,000.  
Client, Brevard Methodist Church,  
Brevard, N. C.

### OHIO

**Wayne A. Becker**  
Cincinnati 38, Ohio.  
Municipal swimming pool, wading  
pool, bathhouse, play area, fencing,  
blacktop paving, flood lighting, filter  
plant, and refreshment building.  
\$125,000 (est.) Client, Village of  
Mariemont, Cincinnati, Ohio.

### OKLAHOMA

**Smith & Tao**  
St. Louis, Missouri  
Commercial dial building, Henryetta,  
Oklahoma. (struc.) \$100,000. Client, South-  
western Bell Telephone Co.  
East dial building, Tulsa, Oklahoma.  
(struc. mech., elec.) \$250,000. Client,  
Southwest Bell Telephone Co.

### PENNSYLVANIA

**Joseph T. Danko**  
Pittsburgh, Pennsylvania.  
Carnegie Institute museum building,  
Pittsburgh, Pa. Reconversion of pow-  
er system from d-c to a-c. (elec.)  
\$1,051,000. Client, Stotz & Stotz,  
Arch. & Eng.

**Ebert & Park**  
Pittsburgh, Pennsylvania.  
W. Greene Junior-Senior High  
School, Rogersville, Pa. (mech.)  
\$750,000. Client, Beall and Parkins.  
PHA housing project, Fayette  
County, Pa. (mech.) \$1,000,000. Cli-  
ent, Altman & Altman.

PHA housing project, McKeesport,  
Pa. (mech.) \$3,000,000. Client, Celli-  
Flynn.

Lock Haven Hospital, Lock Haven,  
Pa. (mech.) \$2,000,000. Client, B. K.  
Johnstone.

Vincentian Home for Aged, Pitts-  
burgh, Pa. (mech.) \$500,000. Client,  
B. J. Marlier.

School for Physically Handicapped,  
Pittsburgh, Pa. (mech.) \$600,000.  
Client, B. K. Johnstone.

**Charles W. Stewart,  
Structural Engineer**  
Huntington, West Virginia  
Coal distribution system and storage  
building. \$100,000. Client, Kenova  
Terminal Co., Pittsburgh, Pa.

### RHODE ISLAND

**C. W. Riva Company**  
Providence, Rhode Island  
North Smithfield Expressway, 5½  
miles, 4-lane divided highway with

ten structures. (civil) \$6,000,000.  
Client, State of Rhode Island.

Waterman Avenue, East Providence,  
2 miles, 4-lane secondary road. (civil)  
\$500,000. Client, the State.

### SOUTH CAROLINA

**Campbell & Leppard**  
Greenville, South Carolina.  
First Presbyterian Church addition,  
Florence, S. C. (mech., elec.) \$50,000  
(est.) Client, Baker & Gill, Arch.  
Distribution system changes, Clem-  
son College, S. C. (elec.) \$16,000  
(est.) Client, Clemson College.

First Presbyterian Church addition,  
Greenville, S. C. (mech., elec.) \$20,-  
000 (est.) Client, Chas. Potter, Inc.,  
Arch., Greenville, S. C.

Douglas Drive School, Greenville,  
S. C. (mech., elec.) \$56,000 (est.)  
Client, R. H. Longstreet & Assoc.,  
Arch., Greenville, S. C.

Weave room ventilating system,  
Clinton, S. C. (mech.) \$14,000. Cli-  
ent, Clinton Cotton Mills, Clinton.

Beth Israel Synagogue, Greenville,  
S. C. (mech., elec.) \$30,000 (est.)  
Client, Beacham Race & Wood, Arch.  
& Eng., Greenville, S. C.

### SOUTH DAKOTA

**Ulteig Engineering Corporation**  
Fargo, North Dakota  
Rehabilitation of street lighting sys-  
tem. Installation of 539 fluorescent  
luminaires, 565 new poles. Client,  
City of Brookings, S.D.

### TEXAS

**The Fluor Corporation, Ltd.**  
Los Angeles, California.  
Redesign and modify No. 2 crude  
unit at Corpus Christi refinery; en-  
gineer and construct 5000 barrels-per  
stream-day Naphtha Unifiner; and  
furnish study to determine most eco-  
nomical method of modifying firm's  
gas recovery plant. \$1,500,000 (est.)  
Client, Pontiac Refining Corp.

**Broyles & Bynum**  
Baytown, Texas  
Additional water supply and sewage  
facilities, Mont Belview, Texas.  
(civil, struc., mech., elec.) \$120,000.  
Client, Chambers County Water Con-  
trol & Improvement District No. 1.

Robert E. Lee High School audi-  
torium, Baytown, Texas. (struc.,  
mech.) \$500,000. Client, Lowell Lam-  
mers, Arch.

**Halsey & Royer**  
San Antonio, Texas  
Boerne Methodist Church air con-



Erected by: THE FULTON-DEKALB HOSPITAL AUTHORITY, ATLANTA, GA.

Architects and Engineers: ROBERT AND COMPANY ASSOCIATES, ATLANTA, GA.  
General Contractor: ROBERT E. MCKEE GENERAL CONTRACTOR, INC.,  
DALLAS, TEXAS

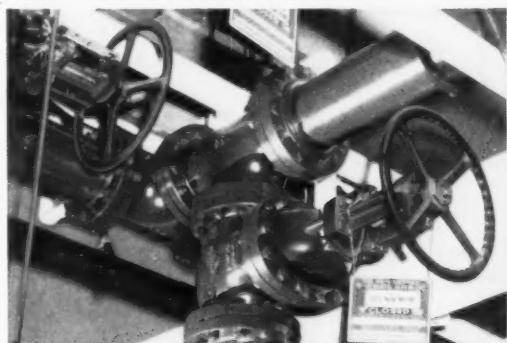
Piping Contractor: J. S. BROWN-E. F. OLDS PLUMBING & HEATING  
CORPORATION, EL PASO, TEXAS  
Fire Protection System: GRINNELL COMPANY, INC.

## GRADY MEMORIAL HOSPITAL selects JENKINS VALVES for long service life

Looked at from any angle, Atlanta, Georgia's new \$21,000,000 Grady Memorial Hospital—1069 beds, 17 operating rooms—is designed for economy in upkeep as well as efficiency. Like all operating equipment, the valves selected for this modern hospital had to pass a tough "physical".

Hospital authorities and builders had no difficulty agreeing on the specification "JENKINS" for all standard valves in the 21-story building. The extra measure of performance and reliability built into Jenkins Valves for generations assured long operating life, and low maintenance cost.

No other valves have such a long record of efficient, economical service. A good thing to remember when you select valves . . . especially since the valves that bear the famous Jenkins Diamond mark *cost no more*. Jenkins Bros., 100 Park Avenue, New York 17.

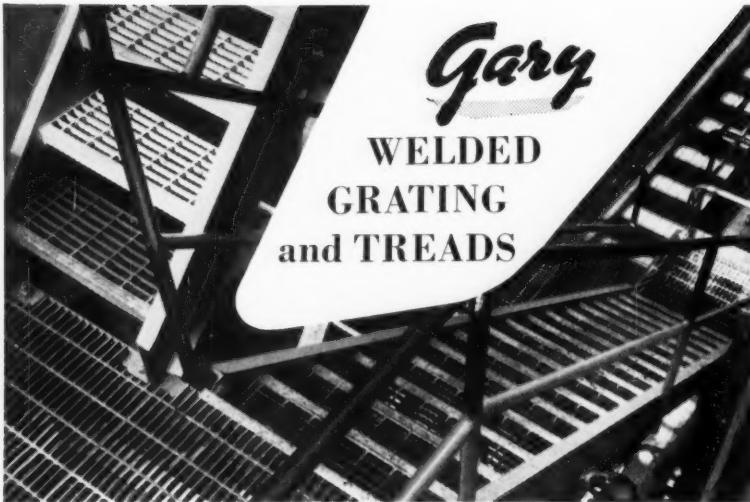


Valves on fire protection lines are among thousands of Jenkins Bronze and Iron Valves on duty at Grady Memorial Hospital.

**JENKINS**  
LOOK FOR THE JENKINS DIAMOND  
**VALVES** SINCE 1864



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- **LIGHT WEIGHT**—for greater load bearing capacity.
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- **OPEN CONSTRUCTION**—gives maximum ventilation and illumination.

Write For Bulletin CE-28

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Company.....

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ditioning. (mech., elec.) \$154,000. Client, Will Noonan, Arch.

St. John's classroom addition. (mech., elec.) \$35,202. Client, Julian & White, Arch.

WOAI transmitter station. (mech.) \$120,000. Client, Geo. Willis, Arch.

Nazareth Academy gymnasium. (mech., elec.) \$220,000. Client, DiStefano & Cerna, Arch.

St. Agnes Rectory. (mech., elec.) \$21,400. Client, DiStefano & Cerna.

### VERMONT

**Thos. W. Reed, Consulting Engineer**  
Pittsford, Vermont

Waterbury Savings & Trust Co., Waterbury, Vt. Complete renovation. (elec.) \$9000 (elec. only). Client, Helmer & Cole, Assoc., Arch., Woodstock, Vt.

### VIRGINIA

**Fortune Engineering Associates**  
Alexandria, Virginia.

Frederick Court Apartments, Arlington, Va. (struc.) \$1,150,000. Client, Frank Martinelli & Son, Arlington.

Stonewall Jackson School, Alexandria, Va. (struc.) \$460,000. Client, Jos. Saunders & Assoc., Alexandria

Holy Comforter Church, Vienna, Va. (struc.) \$95,000. Client, Milton L. Grigg, Alexandria, Va.

214-unit Wright Motel, Arlington, Va. (struc.) \$920,000. Client, John C. Wright, Inc., Arlington, Va.

### WASHINGTON

**R. W. Beck & Associates**  
Seattle, Washington.

1000-unit housing project, McChord Field, Wash. (civil, struc., mech., elec.) \$16,500,000. Client, U. S. A. F.

Sewage treatment plant and collection system, Bellevue, Wash. (civil, mech., struc., elec.) \$550,000. Client, Bellevue Sewer District.

Transmission lines and substations, Walsh. (elec. only) \$600,000. Client, U. S. Navy.

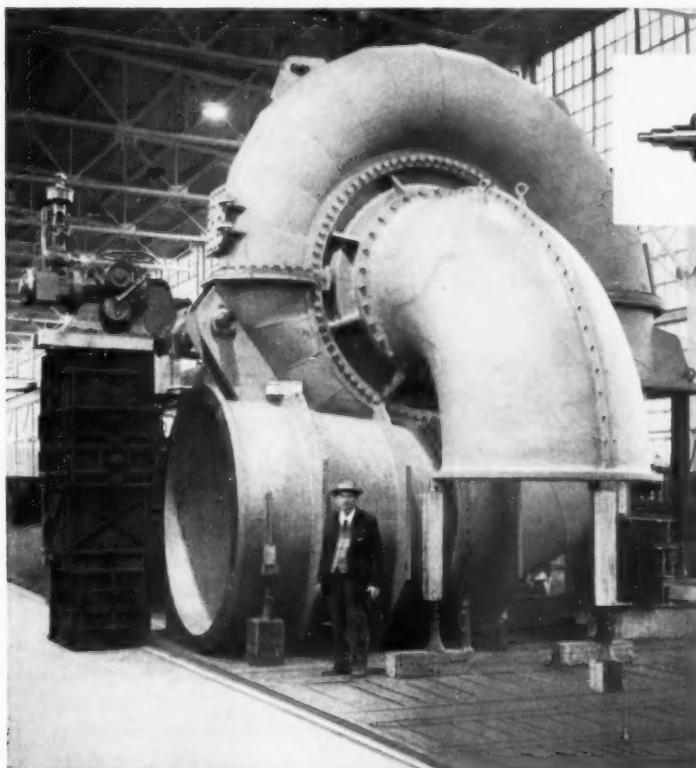
Hydroelectric development, Sultan River, Wash. (civil, struc., mech., elec.) \$40,000,000. Client, P.U.D. #1 of Snohomish County.

### FOREIGN

**Ebasco, Incorporated**  
New York, New York.

Design and engineering inspection of new 175,000-kw thermal electric station at Sendai, Japan. \$7,300,000. Client, Tohoku Electric Power Company and the International General Electric Company.

# LEFFEL BUILDS GIANT HORIZONTAL TURBINE FOR PLEASANT VALLEY



The low net head of 68 ft. at the Pleasant Valley Power Plant near Los Angeles required the design and construction by Leffel of a giant, horizontal spiral case turbine unit. This turbine, rated to develop 3,520 H.P. under the net head of 68 ft. at a speed of 257 R.P.M., drives a horizontal generator. A common shaft carries both the generator rotor and the stainless steel runner. A synchronous by-pass valve allows adjustment of flow for both turbine and by-pass discharge to meet water passage requirements. Photographs here show this giant turbine in various stages of production at the modern Leffel plant.



Leffel has the technical know-how and modern plant facilities to design and construct efficient, economical, rugged turbines of most types and capacities. And Leffel provides fast, complete service. Field engineers are available to assist you in the original planning of your project, and to help you with the actual installation of your turbine.

If you're planning a new project, or the rehabilitation or expansion of old facilities, and you want fast, complete service, contact Leffel, producers of top performing turbines. Mail the coupon below, today, for complete information.

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 Please have your representative call

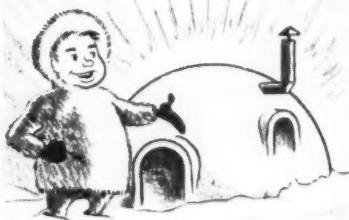
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Company \_\_\_\_\_

Street \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_

# WEATHER OR NOT... SIKACRETE GIVES YOU

- EARLY FLOOR FINISHING
- EARLY STRENGTH



Sikacrete Accelerating Densifier causes early set and quick strength development in both concrete and mortar — thus saving many costly hours of overtime finishing.

Sikacrete is a liquid admixture which enables you to place high quality concrete floors — despite cold weather.

Moreover, Sikacrete gives you these big advantages: greater density, hard non-dusting surfaces, increased ultimate strength and reduced cracking. For complete information, write for Bulletin SI-57.

26-3

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AFFILIATES AROUND THE WORLD



## Books

For the Libraries of  
Consulting Engineers

and a discussion of shock waves are given in the section of the book on mechanics.

An outstanding feature of this book is the previously unpublished material and concepts of analogies. Beginning with the classical electro-dynamical analogies the section continues with the important mobility and classical impedance analogies. In the mobility analogy, mechanical mobility (complex velocity amplitude divided by complex force amplitude) is analogous to electric impedance, velocity to voltage, and force to current. Specific analogies for both types are given in 33 pages of tables.

Extensive pressure-volume-temperature and thermodynamics data are included. Important atomic spectra are presented in tabular form. Characteristic X-ray spectra are given too.

Section eight contains many tables and discussions pertaining to nuclear physics. Particle accelerators located throughout the world are classified in detail. A short presentation on health physics is included.

Perhaps it would have been better for the editors to leave some subsections out of the handbook; for example, those on compressible flow of gases, shock waves, and electrical power practices. These are covered more adequately in existing volumes in the engineering field.

Consulting engineers will find this handbook useful, but they

**on the scene to serve YOU  
...THE MAN FROM STANDARD**



44 offices throughout the country means there's a STANDARD representative near you. The man from Standard is a competent communications and electric systems man with a storehouse of experience in these Standard electric systems:

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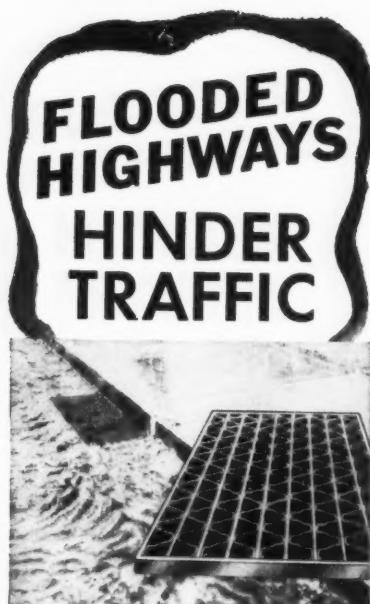
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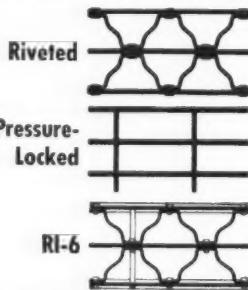
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should keep in mind that the book was organized and written primarily for physicists and the immediately allied fields. Important data, however, are presented in this handbook that are not available conveniently elsewhere.

SIXTH SYMPOSIUM (INTERNATIONAL) ON COMBUSTION, The Combustion Institute; Reinhold Publishing Corp.; 943 pp.; \$18.00.

Reviewed by

Loren E. Bollinger  
The Ohio State University

This important book provides the most up-to-date advances in the field of combustion. Held at Yale University in August, 1956, the symposium heard papers presented by 216 authors representing 10 nations.

The book is a collection of 129 papers concerned with the symposium's basic theme of combustion in its broadest concept. There were 37 papers on the structure and propagation of laminar flames, six on the structure and propagation of turbulent flames, eight on high-speed reactions, eight on flame stabilization in fast streams, nine dealing with instability in combustion chambers, eight on the combustion of solid fuels, eleven on the combustion of explosives and solid propellants, nine on the evaporation and combustion of droplets and sprays, nine covering experimental and analytical techniques, and 20 on various applications of combustion.

In addition, resumes of panel discussions on flame stabilization in fast streams, high-speed reactions, and future problems in combustion research were among the topics presented.

More authors were concerned with the general theme of ignition and flame phenomena in homogeneous combustible mixtures than any other area of research. Dr. Theodore von Karman, in an invited paper, summarized the present status of the theory of

the propagation of laminar flames.

Investigators are continuing their efforts to solve the equations that apply to laminar flame propagation; the reaction kinetics, unfortunately, are so involved that predictions of most flame phenomena are almost impossible.

A valuable new technique, a heavily stirred reactor, is discussed; turbulence in the reactor produces maximum heat-release rates from fuel-air mixtures.

With hypersonic flight at hand, the papers on fast, high-temperature reactions are significant. Combustion of solid fuels received attention because of the technological importance of combustion of coal in world economy.

Since high heat release devices are vital for flight propulsion, the stabilization of flames in fast streams has absorbed the interest of many researchers in the past few years. Results of many studies are reported. The importance of the fuel preparation step and air flow patterns are stressed.

As a result of military declassification and the release of information from company proprietary status, information on the ignition and combustion of rocket fuels by nitric acid and on the synthesis of chemicals by combustion processes was presented at the symposium.

Engineers interested in results from the latest studies in combustion will find this book of great interest. *The Sixth Symposium (International) on Combustion* is heartily recommended as an excellent reference on the latest studies in combustion.

MATHEMATICS FOR SCIENCE AND ENGINEERING, by Philip L. Alger; McGraw-Hill Book Co., Inc.; 360 pp.; \$6.95.

This complete revision of *Engineering Mathematics* by Charles P. Steinmetz presents methods and procedures for finding, understanding, and applying the mathematical procedures best

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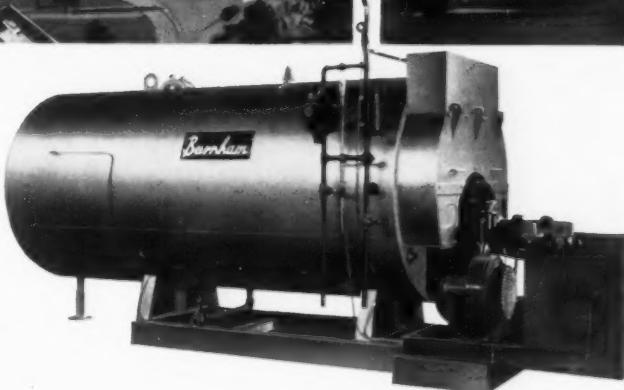
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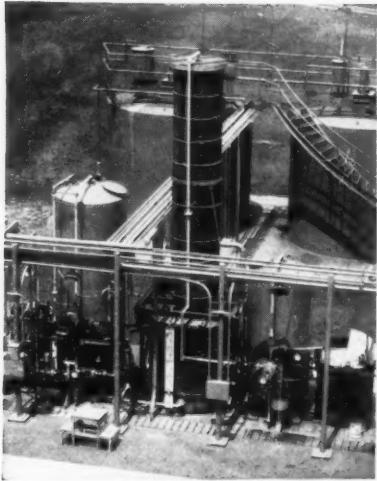
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adapted to solve a particular problem. It aims to help students, teachers, and practicing engineers to use mathematics effectively by first showing the unity and simplicity of the basic mathematical ideas and then making numerical calculations easy. Beginning with a quick review of arithmetic, it goes on through algebra, trigonometry, calculus, probability, and linear differential equations. Emphasis is given to complex numbers, infinite series, and methods of approximation.

instrumentation and controls, analog and digital computers, data processing and input-output equipment, electronics, automatic control of flight, process control in various industries, and the automation of manufacturing operations are thoroughly discussed.

The complex scientific and engineering problems associated with the accelerated use of automation in business and industry have already emphasized the need for consulting engineers with greater over-all knowledge of the various engineering sciences rather than for the specialist. It follows that consulting engineers offering clients design, engineering, or development of complex systems of automation involving mechanical, electrical, structural, chemical, or metallurgical considerations will also become more closely associated with administrative, management, and operational problems of business and industry. The automation and associated engineering problems affords a new and lucrative sphere of activity for consultants.

The 21 authors of this book, all experts in their fields, have documented and reviewed the various ramifications of automation, as they apply to business and industry, in a very thorough manner. Consulting engineers interested in offering such services will serve their intelligent self-interest by making this book a reading must.

NUMERICAL ANALYSIS, by Kaiser S. Kunz; McGraw-Hill Book Co., Inc.; 381 pp.; \$8.00.

This book is designed to develop a fundamental understanding of the use of finite difference methods in obtaining numerical solutions to problems in applied mathematics. Beginning with a study of numerical solutions of algebraic equations, methods of interpolation, and numerical integration, it proceeds to an application of the finite difference tech-

## Here's how Wrought Iron Pipe cuts costs at Cleveland's Southerly Sewage Disposal Plant

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niques to solve ordinary and partial differential equations, and also the numerical solution of integral equations.

The author believes a book of this sort should cover those topics most directly needed for an understanding of the methods used in the numerical solution of differential equations—both ordinary and partial, and in the solution of integral equations. Consequently, considerable time is devoted to finite difference tables and notation, and to numerical differentiation and integration. In preparation for the study of partial differential equations, the book treats rather thoroughly the solution of simultaneous linear equations and multivariate interpolation.

**GUIDANCE**, by Arthur S. Locke; D. Van Nostrand Co., Inc.; 729 pp.; \$12.50.

Reviewed by  
Loren E. Bollinger  
The Ohio State University

The first in the series "Principles of Guided Missile Design," edited by Captain Grayson Merrill (U. S. Navy), this volume considers the fundamental problems of guiding a controlled missile reliably to its target.

With the advent of the Russian Sputniks and our own efforts in space vehicles, more and more consulting engineers are bound to be engaged in the ever-increasing scientific and industrial effort directed toward development of guided missiles. This series of books offers a convenient mechanism for these engineers to become more fully acquainted with the multifaceted problem of guided missile design.

This particular entry is an exposition of the difficulties involved and the procedures used to solve some of the complex problems of guidance.

Written by Arthur S. Locke and a group of associates at the

Naval Research Laboratory, this volume covers the mathematical groundwork necessary for solving guidance problems and presents a quite lucid description of related servo-system theory. Locke, an Associate Director of Vitro Laboratories, directs research in the fields of missiles, instrumentation, data processing, and ordnance. He was engaged in the LARK and SKYLARK missile programs.

Fundamental problems and prior developments are included in the fore part of the book. Basic discussions are given of terrestrial and celestial references, transmission of radio waves, and the emission, transmission, and detection of infra-red waves.

Extensive use of the Laplace transformation and the Fourier transform together with the transfer characteristics and correlation functions place the writing on a solid mathematical foundation. Mathematics for mathematics sake alone, however, is avoided, fortunately.

Detection and information gathering is covered in considerable detail. Specific electronic circuits are avoided. Instead, block diagrams and basic circuit concepts are employed. Consideration is given to the target, the airframe, economics, and the launching phases.

Guidance systems studied include the homing, command, beam-rider, inertial, terrestrial, celestial, and acoustic types.

Interesting discussions are given of signal bandwidth requirements and the problems of missile simulation, computation, and telemetry of data.

On an over-all basis this book can be recommended wholeheartedly to consulting engineers interested in obtaining a survey of guidance devices and techniques. The essential background in missile guidance systems presented will probably provide a convenient reference for those engineers already in the field of guided missiles.

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# Consulting Engineers' Calendar

| Date        | Sponsor                                                                             | Event                                      | Location                                                  |
|-------------|-------------------------------------------------------------------------------------|--------------------------------------------|-----------------------------------------------------------|
| Feb. 3-4    | Instrument Society of America                                                       | National Conference                        | Hotel Du Pont<br>Wilmington, Del.                         |
| Feb. 3-6    | National Bituminous Concrete Association                                            | Annual Convention                          | Flamingo Hotel<br>Las Vegas, Nev.                         |
| Feb. 3-7    | American Institute of Electrical Engineers                                          | General Meeting                            | Statler and Sheraton-<br>McAlpin Hotels<br>New York, N.Y. |
| Feb. 4-6    | The Society of the Plastics Industry Inc.                                           | 13th Conference                            | Edgewater Beach<br>Chicago, Ill.                          |
| Feb. 5      | American Institute of Consulting Engineers                                          | Monthly Meeting                            | Engineers Club<br>New York, N.Y.                          |
| Feb. 10-14  | American Society for Testing Materials                                              | Committee Week                             | Hotel Statler<br>St. Louis, Mo.                           |
| Feb. 11-12  | Building Research Institute and<br>Building Research Advisory Board                 | Board of Governors<br>Joint Meeting        | NAS-NRC Building<br>Washington, D. C.                     |
| Feb. 14-15  | National Society of Professional Engineers                                          | National Board Meeting                     | Kellogg Center<br>East Lansing, Mich.                     |
| Feb. 17-19  | Association of Asphalt Paving Technologists                                         | Meeting                                    | Sheraton-Mt. Royal<br>Hotel<br>Montreal, Canada           |
| Feb. 24-27  | American Concrete Institute                                                         | Annual Convention                          | Morrison Hotel<br>Chicago, Ill.                           |
| Feb. 24-28  | American Society of Civil Engineers                                                 | National Convention                        | Hotel Sherman<br>Chicago, Ill.                            |
| March 3-5   | American Management Association                                                     | Electronics Conference                     | Statler Hotel<br>New York, N.Y.                           |
| March 3-6   | American Society of Mechanical Engineers                                            | Conference and Exhibit                     | Shoreham Hotel<br>Washington, D.C.                        |
| March 5-6   | Building Research Institute                                                         | Conference on Plastics                     | University of<br>Houston<br>Houston, Texas                |
| March 17-21 | The Atomic Industry                                                                 | 1958 Trade Show                            | International<br>Amphitheatre<br>Chicago, Ill.            |
| March 23-29 | American Congress on Surveying and<br>Mapping<br>American Society of Photogrammetry | 1958 consecutive meeting and<br>co-exhibit | Shoreham Hotel<br>Washington, D. C.                       |
| March 27-29 | Electrical Maintenance Engineers Association<br>of Southern California              | Conference & Exhibition                    | Shrine Exposition<br>Hall<br>Los Angeles, Calif.          |

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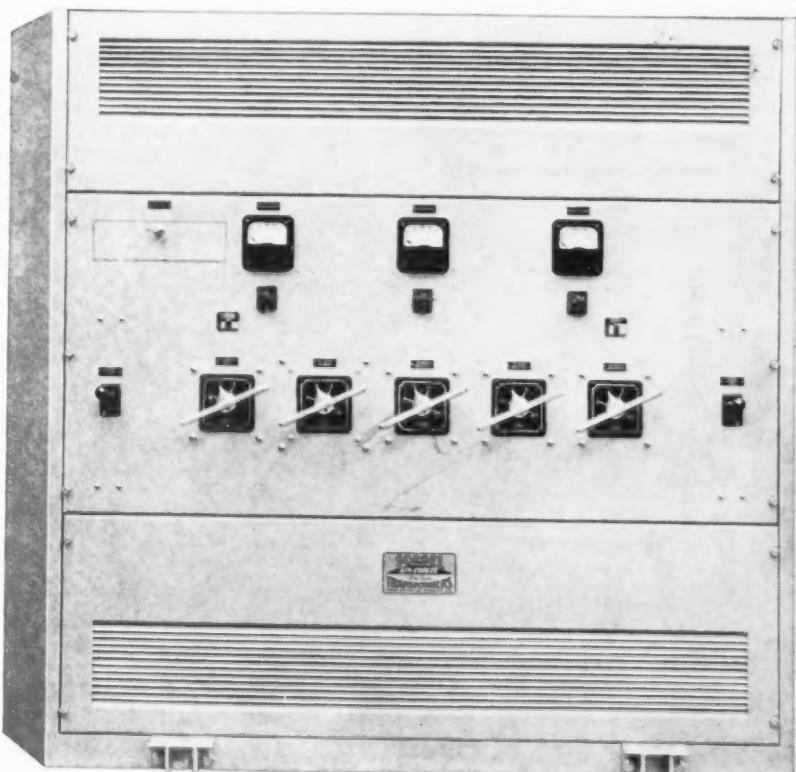
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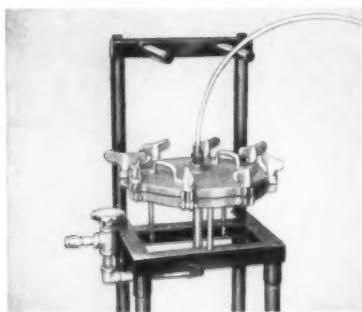
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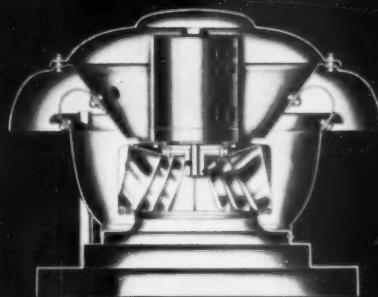
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**Quiet-Tested...Now Time-Tested...**

# **OVER 50,000 CASE HISTORIES CAN'T BE WRONG!**



Jenn-Air Quiet-Tested Centrifugal Direct Drive Roof Exhauster, with U-Spring Suspension Mounting. U-Springs suspend the power assembly, isolate it from the base. Noise caused by vibration is virtually eliminated.

## **Why U-Spring Cushion Suspension Mounting ...**

by JENN-AIR...has now been adapted to JENN-AIR  
Axial Roof and Centrifugal Wall Exhausters



Jenn-Air Quiet-Tested Centrifugal Wall Exhauster, with U-Spring Suspension Mounting. Eliminates most duct work. Provides a means of ventilation through the wall.

**The Facts:** Two years ago Jenn-Air incorporated U-Spring Cushion Suspension Mounting in its Quiet-Tested Direct Drive Roof Exhausters. Since then, over 50,000 units have been installed.

**The Facts:** Not a single failure has been reported. No breakage on record. No instance of shipping damage (wheel binding into inlet), a common occurrence in rubber insulated ventilators . . . Jenn-Air U-Springs absorb the shock of rough handling. Only six recorded cases in 50,000, where the U-springs failed to solve the noise problem.

**The Facts:** U-Spring Cushion Suspension Mounting—which shows 44% less vibration transmission than rubber or neoprene—has now been adapted to Jenn-Air Axial Roof and Centrifugal Wall Exhausters. Another in the long line of Jenn-Air "firsts" that includes: *first* with true low contour design . . . *first* with spun aluminum construction . . . *first* with Quiet-Testing in Jenn-Air's exclusive Sound-Elec Test Chamber . . . *first* with motors lubricated for ten years of normal operation.

**The Facts** explain why you can look to Jenn-Air for quality-engineered exhausters that never wait for the rest of the field to catch up.



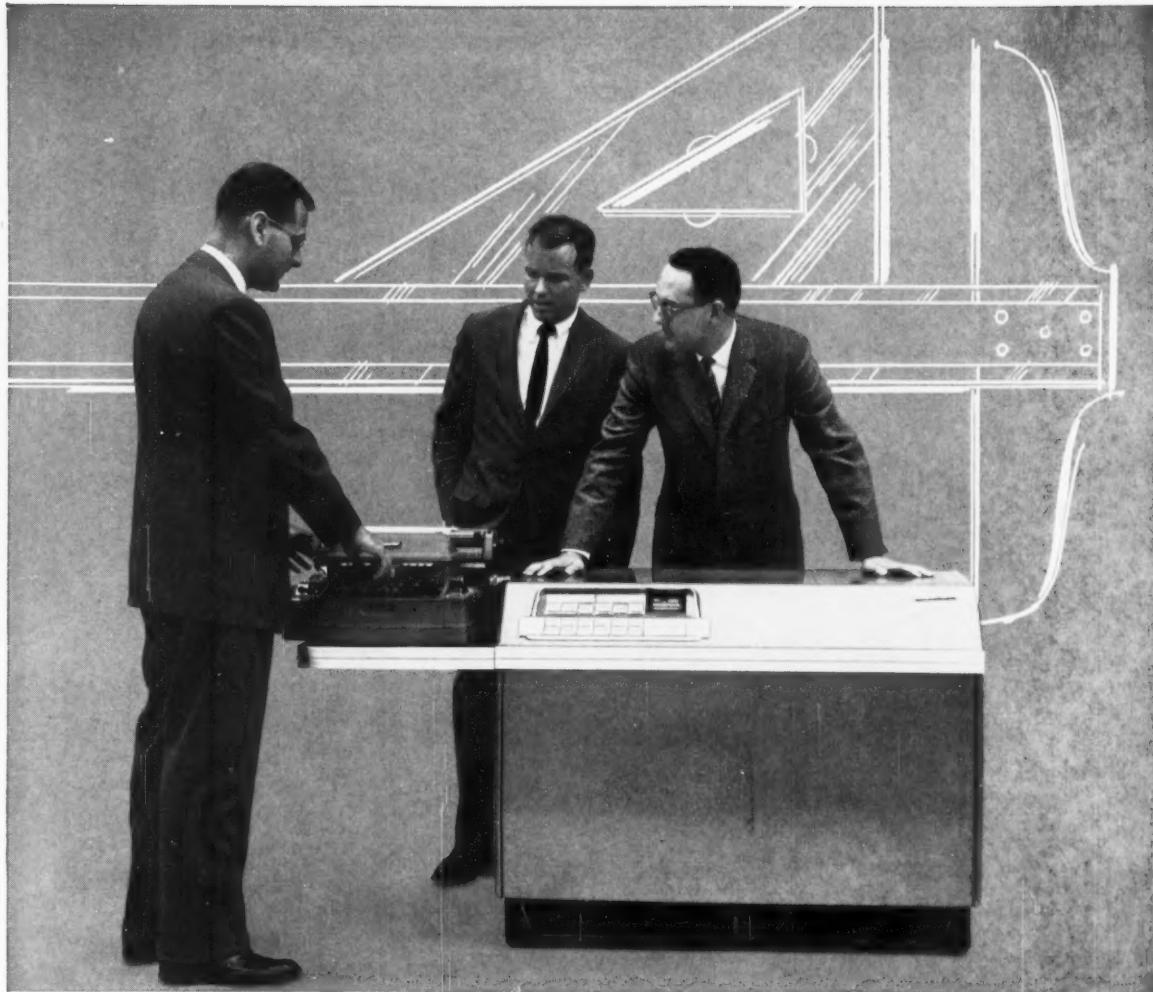
Jenn-Air Quiet-Tested Axial Roof Exhauster, with U-Spring Suspension Mounting. Recommended for general ventilation work and duct-type application.



**JENN-AIR PRODUCTS COMPANY, INC.**

1102 Stadium Drive, Indianapolis 7, Indiana

MEMBER, AIR MOVING AND CONDITIONING ASSOCIATION



**Get greater productivity in highway design  
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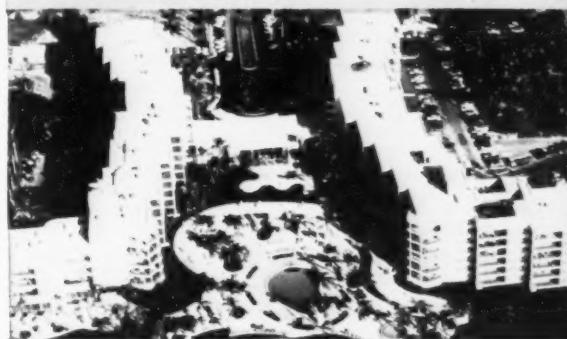
General Offices: Cleveland 3, Ohio • Toronto 9, Ontario • Export: New York 17, N. Y.  
Branch Offices In All Principal Cities • Cable: Mastmethod, N. Y.



General Motors Technical Center — 25-building research facility near Detroit. Archt. — Eero Saarinen & Associates, Bloomfield Hills, Mich. Archt. Engr. — Smith, Hinchman & Grylls, Inc., Detroit. Contr. — Bryant & Detwiler Co., Detroit. POZZOLITH employed in concrete.



Third tube of Lincoln Tunnel, under the Hudson River. Owner and Engineer: The Port of New York Authority. General Contractor: Joint Venture — Mason, Johnson and MacLean, New York City. POZZOLITH Ready-Mix concrete produced by Hudson Builders Material, Inc., Jersey City, N. J.



Palm Beach Towers Hotel, Palm Beach, Fla.; Arch. — John Hans Graham & Assoc., Washington, D. C.; Struc. Engr. — Obolet & Clarke, Miami; Consdg. Engr. — Norman C. Schmid & Assoc., Palm Beach; G. C. — Taylor Construction Co., Miami; POZZOLITH Ready-Mixed concrete — Burnup & Sims, and Rinker Materials, West Palm Beach.



Placing the first concrete pavement in the 41,000-mile Interstate Highway System to be constructed under the Federal-Aid Highway Act of 1956: A 4-mile stretch of 24-foot concrete pavement on U. S. Route 40 west of Topeka, Kansas. Kansas State Highway Commission. Contractor: Koss Construction Co., Kansas Division. POZZOLITH employed in concrete.



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**I-T-E CIRCUIT BREAKER COMPANY**  
PHILADELPHIA, PENNSYLVANIA

# Consulting Engineer



## ADVERTISERS' LITERATURE

This supplement provides a current and detailed description of bulletins, catalogs, and other literature offered by advertisers in CONSULTING ENGINEER. Products and services offered are grouped into the general categories shown below. A full index is provided on the last page. Keep this supplement in your catalog file and refer to it when you need product data. Postcards are provided for ordering copies of bulletins you need.

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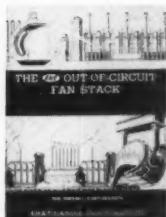
Bring your Technical Reference Files up to Date

Part 2 February 1958

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AIR CLEANING AND DUST COLLECTION

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**1—Fan Stack**

Bulletin 572 has just been issued which describes the application of the P-D out-of-circuit fan stack to the steel and chemical industries. The stacks are capable of ejecting corrosive, erosive, explosive, product laden, and high temperature gases. Gases up to 2000 F in temperatures are successfully handled. *Prat-Daniel Corp.*

**2—Air Filters**

New four-page bulletin 780 presents complete data on the Roll-O-Vent, and describes operation of the continuous Roll-O-Mat filtering media that is fed into the air stream from supply spool to rewind spool. Diagrams and size charts are given for the basic Roll-O-Vent, and also for accessories used with the unit. *American Air Filter Co., Inc.*

**3—Vacuum Cleaning**

Bulletin 153C describes the Spencer Vacuslot. Illustrates the system and its components, and describes the operation. Dirt and litter is pushed to the Vacuslot and whisked away through the piping; mops are then cleaned at the Vacuslot. Illustrates water pick-up, boiler cleaning, and conventional vacuum cleaning. *The Spencer Turbine Co.*

**4—Dust Collectors**

Outstanding features of the National Hydro-Filter dust collector are described in four-page bulletin 556. Ease of operation and maintenance, versatility, cost factors, separating efficiency, controls, and construction and design are discussed. Dimensional data, specifications, and drawings also are provided. *National Dust Collector Corp.*

**5—Dust and Mist Separation**

"The Modern Way to Capture Dust or Mist" describes the cyclone principle of separating dust and mist from air. It contains illustrations of typical Dustkop installations and information on types of equipment available for shipment from stock. Dimensions, specifications, and suggested uses are given for each type. *Aget Mfg. Co.*

**6—Electric Precipitators**

Five fundamental engineering factors governing the success of precipitator installations are fully described and illustrated in a 22-page booklet, "Buell SF Electric Precipitators." Factors include positive gas flow control, uniform electrode emission, rapping method, mechanical construction, and high voltage supply. *Buell Engineering Co.*

**7—Exhaust Fans**

Catalog 1002-6, 32 pages, contains complete performance tables for Norblo high and low speed exhaust fans for dust collecting and air handling. Included are drawings of standard and special arrangements, tables of dimensions and capacities, a friction chart, test curves, and instructions on figuring requirements. *The Northern Blower Co.*

**8—Glass-Bag Filters**

A 4-page technical report, Bulletin 400, describes and illustrates new Dracco Glass-Bag Filters. Includes full technical data on how filters collect hot, corrosive dust and fumes up to 600 F from smelters, furnaces, dryers, and kilns. Typical application is described in detail. Cutaway view shows operational details. *Dracco Corp.*

**9—Discharge Valves**

Folder describes and illustrates the Buell PMF Hopper Discharge Valve, which provides continuous unloading of dust or powder. Two valve discs, actuated by a motor-driven cam, open one after another, preventing back-flow of air or dust. Operation prevents bridging or clogging. Capacity is 103.2 cubic ft per hour. *Buell Engineering Co.*

**10—Dust Filters**

New 36-page bulletin 104 describes the complete line of Sly Dust Filters. It gives detailed information about dust control systems and how to engineer them. Operating principles of the new "Roll-Clean" Dynaclone are described. Complete dust filter system specifications and extensive hopper and support data included. *The W. W. Sly Mfg. Co.*

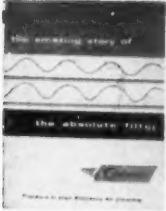
**11—Air Cleaners**

Catalog 76-3805 describes the operation and benefits of two-stage Electronic Air Cleaners designed for air conditioning systems, and provides specifications for four models. It shows how to size cleaners by capacity of the system, efficiency desired and air duct sizes, and how to select the best model. *Minneapolis-Honeywell Regulator Co.*

**12—Bag-Type Dust Collectors**

Four-page bulletin 163-5 describes standard bag type dust collectors designed for noncontinuous or intermittent service and lighter dust loads. Cutaway view, elevation drawing, and table of dimensions and capacities are given, along with a description of both the electrical and compressed air shakers. *The Northern Blower Co.*

### 13—Air Filters



"The Amazing Story of the Absolute Filter," eight-page bulletin 106A, tells about the development of the filter for the Atomic Energy Commission and its subsequent "declassification" for use in industry where critical air cleaning problems exist. Construction, dimensions, applications, and ratings are given. Cambridge Filter Corp.

### 14—Emergency Vent



Bulletin 685 presents Propellair Smoke-Trip emergency vent for smoke and fumes. Designed for use with power roof ventilators having free swinging butterfly dampers and in stack without fan. Suitable for ventilators 24 to 60 inches in diameter. Requires no motors, thermostats, wiring or counterweights. Propellair Div., Robbins & Myers.



### 15—Air Cleaner Section

Catalog 1636 details performance and selection data for electronic air cleaner section as an integral "in-line" assembly with air distributing units. Provides over 95 percent air cleaning efficiency at normal coil face velocities for central plant air conditioning, heating, and ventilating . . . up to 28,000 cfm. Westinghouse Electric Corp., Sturtevant Div.



### 16—Industrial Air Filters

"The New Cambridge Aerosolve Air Filter," four-page folder, introduces a high efficiency, low pressure drop system of air filters designed for multi-filter banks in comfort and industrial ventilation or air conditioning supply systems. Filter characteristics, advantages, operation, and application data are given. Cambridge Filter Corp.

## AIR CONDITIONING, HEATING, AND VENTILATING

### 17—Gas-Fired Furnaces



Form No. LL-179 describes and illustrates company's 1958 lines of Hi-Lo Boy, counterflow and horizontal gas fired furnaces. Contains complete specification information, including input and output capacity ratings on a total of 15 models. Cites details on new "down-sweep contour flame burner". Airtemp Division, Chrysler Corp.



### 21—Roof Ventilators

Bulletin PM-58 contains accurate technical information on Pullman stationary gravity roof ventilators. Sketches show ease of air flow and basic construction features. Dimensions and materials charts are furnished for convenient selection. Accessory items available are pictured and described in bulletin. Penn Ventilator Co.

### 18—Multi-Zone Conditioners



A 12-page illustrated catalog is available covering Acme's broad line of Multi-Zone air conditioners. Eight sizes are offered including vertical and horizontal units in capacities from 1370 cfm to 21,000 cfm as well as a complete line of accessories. Provides all necessary selection data and basic dimension drawings. Acme Industries, Inc.



### 22—Infra-Red Heating

Bulletin describes Panelbloc, modern infra-red method for industrial and commercial area heating. Features are: no fan, no motor, no moving parts, no power consumption, low cost, no fuel wasted, and no excessive heat loss at ceiling — radiates only to floor or working level. Catalog is illustrated. Prat-Daniel Corp.

### 19—Hot Water Boiler



HCC-2, 20-page brochure, describes and illustrates the design, construction, advantages, and economies of the C-E La Mont controlled circulation hot water boiler for supplying high pressure, high temperature water for heating systems and process applications. Layouts and elevation drawings are given. Combustion Engineering.



### 23—Ventilation Systems

This 60-page catalog describes Colt system of ventilation and wide range of equipment available. Since each building presents a different ventilation problem, each operating on the law of diminishing returns, Colt's customized chart instantly gives any engineer the cost of a variety of design solutions. Colt Ventilation of America, Inc.

### 20—Radiant Heating



"Radiant Panel Heating with Steel Pipe," 48 pages, covers the history of this type of heating, basic design, floor, ceiling, and wall panels, information on snow melting systems, pipe coil integration, design of a floor coil system, and a boiler hook-up diagram. Committee on Steel Pipe Research, American Iron and Steel Institute.



### 24—Air Conditioning Units

Four-page bulletin 1312 covers the Hi-Static Multitherm unit, developed principally for high velocity, conduit type air conditioning systems. Available in seven sizes, covering a volume range of about 2500 through 22,000 cfm, and suitable for systems having a static pressure of 8-in. wg maximum. Specifications are given. Clarge Fan Co.



### 25—Central Units

36-page bulletin C1100-B98 describes multi-zone type central air conditioning units. Complete specifications are given for complete line of units adaptable for vertical or horizontal arrangement. Capacities up to 19,200 cfm. Bulletin also gives selection and operating data and dimensional drawings. Worthington Corporation.



### 26—Exhausters

16-page catalog 100-1958 covers Ammerman's AirXpeler. Catalog is divided into four sections. Section A discusses exhausters—wall or roof mounted, direct driven; Section B, exhausters—roof mounted, power operated, belt driven; Section C, dampers—back pressure, shutters, louvers; Section D, fans. Ammerman Co., Inc.



### 27—Steel Boilers

Form No. 984 Scotch Type Steel Heating Boiler Catalog describes the complete line of Scotch Type Steel Boilers now being manufactured by Burnham for both steam and hot water installations. Also available from the same company, is the Burnham Scotch Type Fully Packaged Oil Heating Unit. Burnham Corp.



### 28—Air Handlers

Acme offers a 24-page illustrated catalog on their complete line of central air handling equipment. Provides information on 14 different models in both horizontal and vertical types as well as a wide variety of accessories. In addition to dimensioned drawings, catalog furnishes complete selection data. Acme Industries, Inc.



### 29—High Velocity Ventilators

A new, "Penn Hi-Ex," six-page bulletin PH-44H furnishes complete information on direct and v-belt driven high velocity ventilators. Illustrated construction features show operating procedure in detail. Performance tables indicate exhaust capacities up to 40,000 cfm. Dimensional data charts are included. Penn Ventilator Co.



### 30—Space Heaters

Bulletin No. 564 describes an entirely new concept of burning fuels in direct-fired forced-air space heaters. Separate sections discuss the new burner and combustion chamber, and tables provide dimensions and engineering data. Heaters are available in output capacities from 250,000 to 2,000,000 Btu per hr. Dravo Corp.



### 31—Vaneaxial Fans

New belt-driven vaneaxial fans, for maximum efficiency against high static pressures, are described in bulletin 450. Units overcome swirl or turbulence in duct systems with propellers and guide vanes that counteract torque and pass air through in a straight stream. Sizes 12- to 48-in. diameter, capacities to 47,000 cfm. Aerovent Fan Co., Inc.



### 32—Steam Coils

"Marlo Steam Coils," 24-page bulletin 10, includes photos and construction features of all Marlo coils: dimensional data; method of selecting the proper coil for any installation; capacity rating charts; capacity data; and installation methods. Information is in table form for quick and easy reference. Marlo Coil Co.



### 33—Cabinet Air Conditioner

New Nesbitt Roommate Cabinet Air Conditioner is fully described in 20 page catalog No. 600-1 that explains exclusive comfort-economy features; year-round by-pass capacity control; and outdoor air volume stabilizers. Details, arrangements, capacities, selection procedure, dimensions, and specifications. John J. Nesbitt, Inc.



### 34—Cabinet Heaters

Bulletin B-1740, Cabinet type Unit Heaters, describes the new Deluxe Series Webster Cabinet Heaters suitable for use in lobbies, foyers, offices, etc. Available in cabinet form and for semi-recessed, fully recessed, and concealed installations, with a wide choice in location of intake and discharge. Warren Webster and Co.



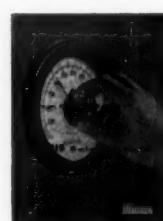
### 35—Power Exhausters

Bulletin 58-A, "Power Exhausters," a brand new catalog describing the complete line of Jenn-Air exhausters, is now available. Bulletin includes many new models. New capacities up to 23,000 cfm. Complete capacity table and specifications for each type of unit are included in this new bulletin. Jenn-Air Products Co., Inc.



### 36—Power Roof Ventilators

Eight-page bulletin No. 2301 describes in detail direct driven exhaust and supply propeller type power roof ventilators. It introduces Ilg new low silhouette type L-LSQ (exhaust) and L-SRQ (supply) models that harmonize perfectly with modern architectural requirements, ratings, and dimensions. Ilg Electric Ventilating Co.



### 37—Steam Heating System

"Tune in with the Weather," 16-page bulletin 540, describes Selectotherm, an automatically controlled vacuum steam heating system with a single dial control to balance heat supply against heat loss. A drawing of a typical arrangement is provided, along with specifications, a selector guide, and performance data. Illinois Engineering Co.



### 38—Burners

This new 16-page booklet illustrates and describes Ray Burner equipment for firing oil, gas, or combination oil or gas; manual, semi-automatic, and fully automatic models; rotary, pressure atomizing inshot gas, packaged forced draft boiler-burner units. A burner for every domestic, commercial, or industrial need. Ray Burner Co.



### 39—Heating Boilers

Catalog No. S B 106 covers the complete line of Burnham Compact Type Welded Steel Heating Boilers. The catalog is complete with typical installations, ratings, and dimensions, and capacities of hot water coils both for storage and tankless operation. Illustrated with dimensions and ratings. *Burnham Corp.*



### 40—Roof Ventilators

Burt Centriflow Fan Ventilators are quiet, highly efficient, direct or V-belt drive, recommended where low noise levels are required. Motors from 1/12 to 7½ hp and a wide range of sizes provide capacities from 408 to 36,430 cfm. All models are P.F.M.A. certified. Bulletin SPV-12A contains complete detailed data. *The Burt Mfg. Co.*



### 41—Cabinet Heaters

Bulletin 1306 describes and illustrates the new line of Ilg series "A" cabinet heaters equally suitable for steam or hot water applications. Capacity tables, dimensional drawings, and suggested arrangements are given for each model. Also included are sample fan specifications, sound ratings, and other useful data. *Ilg Electric Ventilating Co.*



### 42—Make-Up Air Unit

A new air make-up unit designed to temper outside air and supply it in sufficient quantities to eliminate negative pressures is described in bulletin 850. Make-up air units are available in seven unit arrangements in six sizes from 24 to 54 inches, with air capacities ranging from 4000 to 33,000 cfm. *Aerovent Fan Co., Inc.*



### 43—High Temperature Water Heating

Basic advantages of the Type LFW Forced Recirculation Generators for high temperature water are given in ten-page bulletin 700. Chart compares capital investment, operating costs, and maintenance and repairs for high temperature water and high pressure steam for district heating from central plant. *The International Boiler Works Co.*



### 44—Air Diffusers

Selection Manual No. 60, 80 pages, on air diffusers for air conditioning, heating, and ventilating systems, contains numerous diagrams, tables, and photographs to aid in the selection of the correct units for All-Air high velocity systems, conventional systems, and high temperature differential systems. *Anemostat Corp. of America.*



### 45—Cleanable Cooling Coils

Bulletin R-50 describes and illustrates Aerofin Type R Removable-Header Water Coils. These are cleanable-tube extended-surface coils for cooling air with water. Principal advantages are easy cleaning of tubes and positive drainage. Engineering data for various pass arrangements are given to assist in selection. *Aerofin Corp.*



### 46—Air Cooled Condensers

New six-page bulletin U-391 entitled "Kramer Unicon for Unlimited Tonnage" describes operation and application of Unicon, the original remote type air cooled condenser for air conditioning and refrigeration equipment of any tonnage. Dimensions and selection tables are also included. *Kramer Trenton Co.*



### 47—Dual Purpose Fire Ventilators

"Fire Prevention in Industrial Buildings" explains the reason for the spreading of the disastrous General Motors fire of 1953: lack of roof openings or any form of natural ventilation; and Colt's new combination controllable ventilator that is also an automatic fusible link fire and smoke ventilator. *Colt Ventilation of America, Inc.*



### 48—Smooth-Fin Heat Exchangers

Bulletin S-55 describes new smooth-fin heat-transfer coil construction that permits closer fin spacing, greater capacity per sq ft of face area, and use of higher air velocities without turbulence or excessive friction. It also illustrates many types of extended-surface heat exchangers for heating, cooling, and processing. *Aerofin Corp.*



### 49—Centrifugal Fans

Catalog 1121 details the efficiency and quietness of airfoil blading for all purpose applications in a complete standard line of centrifugal fans, (Series 8000) covering every requirement up to 700,000 cfm . . . and up to 16½-in. total pressure. Sized to AMCA-NAFM Standards, Classes I-IV. *Westinghouse Electric Corp., Sturtevant Div.*



### 50—Propeller Fans

Bulletin A-109 gives descriptions, specifications, dimensions, and performance data on Hartzell's line of propeller fans for industrial ventilation. This 40-page bulletin covers standard, Lo-Noise, and high pressure fans; direct drive, belt driven, and bi-pass duct fans; unit heaters; and other ventilation equipment. *Hartzell Propeller Fan Co.*



### 51—Heating and Ventilating

The Make-Up AIR, using Steelfin coil, now adds to its family a heating and ventilating unit, using Aerofin copper coil. All sections are individually supported, removable for maintenance or replacement. Nine basic blower sections are available, in any rotation. Capacities from 1500 to 30,000 cfm listed in bulletin 567. *New York Blower Co.*



### 52—Adjustable Pitch Fans

Bulletin A-111 describes adjustable pitch fans for heat exchanger and cooling tower use and for mine ventilation. Line includes 14- and 22-ft models with formed Hartzite plastic or plastic-impregnated wood blades, 10- to 14-ft models with molded plastic blades, and 40- to 120-in. all aluminum type fans. *Hartzell Propeller Fan Co.*



### 53—Refrigeration Tables

New 36-page tables for the refrigeration engineer. Best available data, including new thermal data based on spectroscopic measurements; electronically computed; expanded range for saturated and superheat properties; smaller temperature and pressure intervals. General Chemical Div., Allied Chemical & Dye Corp.

### 54—Performance Ratings

Bulletin 152-57 describes new program enabling users of air moving equipment to identify brands of products that perform according to stated performance ratings. It tells how the identifying "AMCA Certified Rating" Seal protects users against inaccurate ratings. Dimensions and illustrations. Air Moving & Conditioning Assn., Inc.

### 55—Package Units

The Dunham-Bush bulletin on 'CPU' describes components and gives vital statistics on commercial package units. Included are capacity data chart of cooling and heating capacities, CPU specifications for each size unit, and an air circulation diagram. Subsidiaries and sales offices are listed on the back cover. Dunham-Bush, Inc.

### 56—Square Heat Boilers

Bulletin 3312-3 gives complete information on Kewanee new square-heat type "R" boiler packaged for gas firing. Ratings are from 243,000 to 1,350,000 Btu/hr for low pressure steam or hot water heating. Units are furnished with all controls and distinctive insulating jacket. Kewanee Boiler Div. of American-Standard.

### 57—Cooling Towers

Bulletin 60 covers the Marlo line of cooling towers for residential, commercial, and industrial use, in sizes up to 100 tons refrigeration capacity. Quiet operating, can be installed indoors or outdoors. All-metal construction, completely fireproof. Protected against electrolytic corrosion of sump tank with "Electro-Tekton." Marlo Coil Co.

### 58—Refrigerating Machines

Catalog 19C-104 is an easy-to-read catalog for quick selection of those machines with capacities from 90 to 110 tons. Complete data for each of 28 models featuring pushbutton operation and low installation costs is given. Light weight, designed for rooftop location. Vibrationless performance eliminates special foundation. Carrier Corp.

### 59—Sill-Line Radiation

A new Nesbitt Sill-line Catalog, Publication No. 30-1a, gives description, capacities, and dimensions of this attractive high-capacity finned tube type radiation. Introduced is the exclusive Nesbitt two-tube heating element for steam or hot water. Includes detail drawings of the many arrangements and sizes available. John J. Nesbitt, Inc.



### 60—Direct-Drive Fans

New 4-page catalog 6514 describes the new model K Ventura fans and explains their significance. Performance data such as delivery ratings, fan speed, motor horsepower, quietness rating, and maximum net weight are given for the forty-five different direct-drive fan units. American Blower Corp., Div. of American-Standard.

### 61—Door Heaters

Explains and illustrates applications of Door Heaters which put a curtain of high velocity hot air between outside cold air and workers indoors when doors are opened. Included are selection charts for using proper size door heater for given size door and temperature conditions. Dimensions, data, and control methods. L. J. Wing Mfg. Co.

### 62—Fan Standards

Bulletin No. 110 outlines standards for centrifugal, axial, and propeller fans adopted by AMCA, ASHAE, & NAFM. It includes related definitions, terms, size standards, and standard test codes with formulae. Eighteen plates illustrate approved test set up, log sheets, typical performance curves. Air Moving & Conditioning Association.

### 63—Ceiling Diffusers

A revised 28-page catalog containing complete information on the Barber-Colman Venturi-Flo Ceiling Diffuser is now available. This literature includes descriptive data, dimension drawings, ordering information, typical installations, and accurate performance data. Catalog designation is No. F-4085-5. Barber-Colman Co.

### 64—Bifurcator Fans

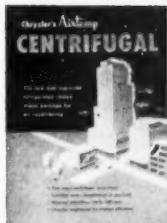
Catalog DB-37-55, 16 pages, describes operation of the Bifurcator Fan, a split-housing fan that exhausts hot, corrosive, and flammable fumes. Use of the bulletin makes fan selection easy since it gives full data on fan laws and static pressure and charts on velocity pressure and friction. De Bothezat Fans, A Div. of American Machine & Metals, Inc.

### 65—Year 'Round Comfort

Bulletin 6014 covers technical information on specifications for steam heating capacities, capacity and pressure drops, chilled water capacities, unit selection, wiring diagrams, and temperature control; also specifications, ratings and dimensions. Photographs and a brief descriptions of units are included. Dunham-Bush, Inc.

### 66—Scotch Boiler

Bulletin 3213-2 illustrates and describes in detail the new Kewanee Welded Scottie Junior LM Series Boiler. Complete specifications for 8 sizes from 606,000 to 30,060,000 Btu/hr for steam or hot water heating are covered in this new completely illustrated bulletin. Kewanee Boiler Div. of American-Standard.



### 67—Airtemp Centrifugal

Form No. AC-285 contains information on the company's recently marketed new series of 150 hp to 500 hp centrifugal water chillers. Describes compressor, impeller, guide vanes, lubrication system, motor, evaporator, refrigerant feed, eliminators, condenser, and controls of new centrifugal units. Airtemp Division, Chrysler Corp.



### 68—Gas Heating Equipment

Catalog GN-57 deals with a complete line of gas-fired commercial and industrial heating equipment, including suspended gas unit heaters, both fan and blower types; the Flexitemp floor model heater; two series of duct furnaces; and a horizontal furnace. It includes complete specifications and construction details. Reznor Mfg. Co.



### 69—Ventilators

Louvers and gravity, powered, and centrifugal ventilators for industrial, commercial, and public buildings are described in 20-page condensed catalog 353. Dimensional drawings, installation data, dimensions and weights, operating methods, and cutaways are given for the various types available. The Swartwout Co.



### 70—Heavy Duty Fans

Twenty-page bulletin F-200 covers the Type BLH heavy duty fans for industrial air handling for class II through IV service. Sketches and photos illustrate features of construction. Performance curves show horsepower savings possible. Outlet velocity tables are given for each size with selection data. Buffalo Forge Co.



### 71—Modulating Zone Heating

Application of the SelecTemp heating system to commercial buildings of all types and sizes is described and illustrated in eight-page folder 5627. This system, featuring a non-electric thermostat on each unit, provides temperature control in each individual room or area. Construction is shown. Iron Fireman Manufacturing Co.



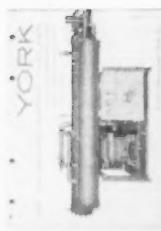
### 72—Steam Humidifiers

"Humidification for Profit," 16-page bulletin 5000, presents statistics that show how relative humidity affects hygroscopic materials, health and comfort, and formation of static electricity. Schematic diagrams and sectional drawings demonstrate operation of electrically and air operated steam humidifiers. Armstrong Machine Works.



### 73—Zone Control Cabinets

"Year 'Round Comfort with One Central Unit," four-page bulletin AC-2500, describes the Model G Zone Control Cabinets, Types PCB and VPCB, for heating, ventilating, and air conditioning where one unit must provide air for several zones. Construction and operation are covered for manual and automatic control. Buffalo Forge Co.



### 74—Water Chillers

York 36-page bulletin 30-F-21, v/w Packaged Water Chillers," covers capacities, benefits, features, typical hookups, wiring diagrams, ratings, engineering specifications, and how to make selections. Catalog is fully illustrated and has tables for easy selection. Detail drawings and dimensions included. York Corp.



### 75—Centrifugal Roof Ventilators

A centrifugal roof ventilator aerodynamically designed to exhaust against high resistance and offering flexibility, space-saving, and economy is illustrated and described in Bulletin 565. Capacities and dimensions are included, together with descriptions of propeller-type roof ventilators for lower resistances. New York Blower Co.



### 76—Air Conditioning

Precision control of air temperature and moisture enable your client to produce his product in any climate, at any season, according to six-page bulletin 122. The Type "A" air conditioner described, for drying or moistening of air, is shown in typical installation photographs. Drawing points out operation. Niagara Blower Co.



### 77—Rotary Positive Blowers

Bulletin AF-154 contains descriptive information and operating data regarding rotary positive blowers of seven inches gear diameter and smaller. These blowers are rated from 1 to 10 psig and will handle from 10 to 920 cfm of air. Included in this bulletin are selection and dimension tables, performance data, drawings. Roots-Connersville Blower.



### 78—Steam Coils

New 8-page illustrated catalog B-1418 describes the new type D-1 double-tube steam distributing coils and gives complete physical data illustrated with an installation type drawing. A 2-page section includes tables on final air temperature and temperature rise correction factors. American Blower Corp., Div. of American-Standard.



### 79—Gravity Roof Ventilators

The Swartwout-Dexter heat valve, a continuous gravity roof ventilator, is presented in eight-page bulletin CAM-2. A chart shows how the heat valve compares with round ventilators in providing area of ventilating opening. Dimensions, installation drawings, and details of various types of dampers are given. The Swartwout Co.



### 80—Refrigerant Condensers

Engineering data on a complete range of sizes and types of condensers for ammonia and freon refrigerants are given in 40-page bulletin RC-2, "Refrigeration Condensers." Closed, horizontal multipass types, and open, vertical singlepass types are featured. Piping sizes and temperature tables also are included. Henry Vogt Machine Co.



### 81—Absorption Refrigeration

Catalog 16C-110 gives selection ratings, physical dimensions, condensing water nozzles arrangement diagrams, and case histories exemplifying flexible application. Uses steam or any hot fluid to produce chilled water in capacities from 60 to 700 tons. Automatic push-button control. Low installation cost and operation economy. *Carrier Corp.*



### 82—Thermal Data

New 36-page tables for the refrigeration engineer. Best available data, including new thermal data based on spectroscopic measurements; electronically computed; expanded range for saturated and superheat properties; smaller temperature and pressure intervals. *General Chemical Div., Allied Chemical & Dye Corp.*



### 83—Plant Conditioners

Engineering catalog with illustrative and descriptive information and complete selection data on central plant conditioners, multizone conditioners, sprayed coil units, heating—ventilating units, cooling and heating coils. This catalog is notebook type and is index tabbed for easy and quick use. *Thermal Engineering Corp.*



### 84—Draft Inducers

Bulletin I-57 describes draft inducers for heating boilers and power plants, ranging from small domestic and commercial heating units to those for boilers up to 120,000 lb per hr. Packaged design units are factory assembled, with air-cooled fan bearings and interchangeable inlet panels. Motor, turbine, or dual drive. *L. J. Wing Mfg. Co.*



### 85—Ventilator Control

Data Sheet F-8527 describes the functions and operating sequence of Barber-Colman's new control package for face and by-pass unit ventilators. Designed to change over control from heating to cooling automatically through a strap-on change-over thermostat. Specifications for specifying complete control package. *Barber-Colman Co.*



### 86—Comfort Curtain

This bulletin describes the new comfort curtain system of heating and ventilating for school classrooms, churches, and commercial bldgs. Included are diagrams, descriptions, and specifications for the equipment. Outstanding advantages of this system include comfort, economy, and responsive operation. *Lennox Ind. Inc.*



### 87—Fintube Radiation

Catalog (Form No. 864A) describes fintube radiation, used for efficient, economical heating of all types of buildings, such as factories, hospitals, schools, and offices. Covers, enclosures, and heating elements are explained and shown. Installation practices are illustrated and fintube accessories listed. *National-U.S. Radiator Corp.*



### 88—Industrial Heaters

Bulletin SWBI deals with Industrial Heaters for space heating, drying, make-up air, and oven applications. There are engineering data for eight different models in this bulletin, along with dimensions for inverted and horizontal installations. The heaters may be operated with oil, gas or combination fuels. *Lennox Ind. Inc.*



### 89—Linear Diffusers

One- and two-way blow linear diffusers are discussed in 12-page catalog No. 114. Tables are given for 3½-in., 6½-in., 7-in., and 13-in. Listed size performance data and engineering data are given. Includes list prices for linear diffusers and linear dampers. Specifications included. *Tuttle and Bailey Div., Allied Thermal Corp.*



### 90—Boiler-Burner Units

The Weenco-Ray 3-pass packaged boiler-burner units for heating, power, and process steam are featured in this 1958 catalog. Ratings, data and dimensions, installation details, and other specification data are given in this eight-page booklet. Capacities of these boiler-burner units range from 25 hp to 600 hp. *Western Boiler Co.*



### 91—Coal-Pak Boiler

Bulletin 1100 describes new line of completely automatic coal-fired water tube package boilers for steam or hot water generation. Available for low or high pressure service in capacities from 71.6 to 300 hp. Generator features unique, water-cooled pulsating grate, automatic coal feed, and ash removal. *The International Boiler Works Co.*



### 92—Condensing Units

The Brunner catalog 47 describes their commercial refrigeration condensing units, ¼ to 10 hp. Detailed information, cross-section illustrations and types of units are given; also photos and complete data on all compressor models. Data includes specifications, dimensions, and capacities for each compressor. *Brunner Div., Dunham-Bush, Inc.*



### 93—Air Conditioners

New 32-page catalog 30-F-2, "Fan Coil Air Conditioners," is available. Catalog covers advantages, typical system, removable parts, engineering specifications, etc. Gives nomenclature, dimensions, weights, fresh air intake, mounting diagrams, and water and electrical connections for floor, wall, and ceiling units. Tables included. *York Corp.*



### 94—Fan Ventilators

Extremely fast removal of contaminated air is provided with the efficient Burt Free-Exhaust-Fan ventilator. With dampers open an unrestricted column of air is exhausted by its specially designed Burt Axial Flow Fan. Dampers close automatically with motor off. Bulletin SPV-18 gives complete information. *The Burt Mfg. Co.*



### 95—Centrifugal Roof Ventilators

Bulletin SDA-220 deals with the Peerless Belt and Direct Drive Centrifugal Roof Ventilators which have recently been added to the Peerless Roof Ventilator line. Features, construction details, performance data, dimensions and recommended specifications are presented on both direct and belt drive units. *The Peerless Electric Co.*



### 96—Coal for Heating and Cooling

This 16-page brochure describes fully the boiler plant for heating and cooling the recently completed Hillside Shopping Center, Hillside, Illinois. This is another example in a series of well-engineered coal-fired plants. Drawings are included showing the boilers and coal and ash-handling equipment. *Bituminous Coal Institute.*



### 97—Process Apparatus

Bulletin 135 describes Niagara apparatus for process and chemical industries: air conditioning, heating, cooling, condensing units. Functions include heat removal for products, processes, vacuum distillation, refrigeration, air liquefaction; temperature control, moisture, purity for drying, low temperature conversion, testing. *Niagara Blower Co.*



### 98—Fans

Catalog 221, 92 pages, presents comprehensive data on Clarage Type NH fans. Information is conveniently arranged to enable engineers, designers, and architects to select readily the proper fan equipment to meet specific air handling and conditioning requirements. Charts, tables, and graphs are included. *Clarge Fan Co.*

## ELECTRICAL EQUIPMENT



### 99—Dry-Type Transformers

New 8-page, slim-size bulletin, GEA-3424, gives 7 guides for selecting and installing Quiet dry-type transformers. It includes a chart on the average sound levels of typical locations and gives pointers on locating and mounting dry-type transformers. Bulletin describes sound ratings testing methods. *General Electric Co.*



### 103—Circuit Breakers

Bulletin 3411, 24 pages, covers 1-, 2-, and 3-pole hydraulic-magnetic circuit breakers (0.010-100 amps) used in panel-board and equipment installations. Explains hydraulic-magnetic actuation and includes time-delay curves, special circuits and features, ratings, dimensions, terminal styles, and U.L. listings. *Heinemann Electric Co.*



### 100—Safety Electrification

Catalog 8-58, newly revised, describes Insul-8-Bar enclosed conductor systems for cranes, monorails, moving machinery. Contains complete engineering data, illustrated parts list, installation instructions. System capacities are 90 to 500 amperes. Standard catalog parts meet all installation and operation requirements. *Insul-8-Corp.*



### 104—Protection Handbook

Shows how to select correct protective devices for electric circuits, motors and apparatus. Interprets Code rules on motor protection. Gives motor protection table showing size of ordinary fuse or Fusetron fuse to use and shows size of switch or fuse-holders required. *Bussmann Mfg. Div., McGraw-Edison Co.*



### 101—High Speed Circuit Breakers

Six-page bulletin 3004-A contains descriptive and technical information about the FB line of high speed, current limiting d-c circuit breakers. Principal applications of these breakers are for generators, motors, anode protection, and as feeder breakers. Wiring diagrams and outline drawings are included. *I-T-E Circuit Breaker Co.*



### 105—Circuit Protection

Newly released 20-page bulletin B-7232, discusses "The Search for Perfection in Circuit Protection." Bulletin also includes complete system protection, science of circuit breaking, solenoid and pneumatic operating mechanisms, oil breakers, arc interruption, and measurement of interrupted current. *Westinghouse Electric Corp.*



### 102—Remote Control Switches

Catalog 57-S2 describes the comprehensive ASCO line of electrically operated, mechanically held remote control switches. Application, construction, and operational information, along with list prices, dimensions and weights. Listings are in capacities from 30 to 1000 amperes, to 600 volts ac and 750 volts dc. *Automatic Switch Co.*



### 106—Covers and Plugs

Offers a complete line of "Seal-Tite" Rubber Covers and Closure Plugs for "Twist-Lock" Connector Bodies, Caps and Motor Bases for positive protection against moisture, dust, dirt, lint, or metal chips and filings. Also shown in this new folder is a Selector Chart listing the right covers for "Twist-Lock" units. *Harvey Hubbell, Inc.*

### 107—Motor Control



A newly designed high-voltage starter for motors to 3000 hp at 4000/4800 volts and 1500 hp at 2300 volts is described in 8-page bulletin 14B8507. Both air-break and oil-immersed contactors are listed. Features that are described include front accessibility, protection for machines and personnel, and space savings. *Allis-Chalmers*.

### 108—Low Voltage Switchgear



20-page, two-color bulletin, No. 6004-C, provides a complete review of the company's new low-voltage power circuit breakers and switchboards, ranging in unit ratings from 225 to 4000 amperes. Advanced features of the new K-Line breakers, whose ratings are 225, 600 and 1600 amperes are described. *I-T-E Circuit Breaker Co.*

### 109—Wiring Devices



340-page "Wiring Devices," catalog 29 is now available. Catalog is very complete. Covers accessories, adapters, combination units, cord connectors, current taps, enclosed switches, floor outlets, grounding type devices, heater plugs, louvre lighting, pilot lights, and all types of plates. Catalog is fully illustrated. *Arrow-Hart and Hegeman Electric Co.*

### 110—QMR Panelboard



A new heavy-duty fusible power panelboard type QMR, is the subject of a new four-page bulletin. The new panelboard is designed for maximum 600-volt a-c service, two- or three-wire single-phase and three- or four-wire, three-phase applications. Complete ratings and dimensions are listed. *General Electric Co., Trumbull Division*.

### 111—Products Guide



This 16-page bulletin contains descriptive data on major products manufactured by I-T-E, such as: power switching equipment, metal-enclosed bus, metal-clad and low voltage metal-enclosed switchgear, unit substations, air-circuit breakers, network analyzers, mechanical rectifiers, and porcelain insulators. *I-T-E Circuit Breaker Co.*

### 112—Single Phase Transformers



Bulletin 100A contains, in table form, complete statistical information on Hevi-Duty single phase, dry type, insulating transformers, .050 to 500 kva, for power and lighting circuits. Photographs, dimension drawings, capacities, prices, temperature rise, weights and dimensions are given for each transformer listed. *Hevi-Duty Electric Co.*

### 113—Distribution Transformers



Bulletin S-401-B covers single phase, oil filled distribution transformers in sizes through 500 kva and voltages through 15 kv. These transformers are used for pole type installations, platform mounting and in plant use. The transformers are designed to meet all of the NEMA, EEE, and ASA standards. *Standard Transformer Co.*

### 114—Wiring Devices



Catalog 60 features 75 illustrated pages describing a complete range of electrical wiring devices in both the interchangeable Despard line and the P&S conventional line. Everything from switches to fixtures — devices for every conceivable purpose — are listed. A 15-page index and price list is included. *Pass & Seymour, Inc.*



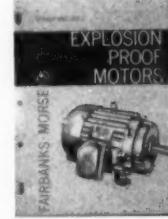
### 115—Switching Equipment

Bulletin GEA-6623 describes a new equipment for normal switching duty and fault protection in commercial and industrial power systems. Equipment is rated 2.4 to 13.8 kv, and is available in indoor or outdoor enclosures. Bulletin describes components and safety features, and includes application data and dimensions. *General Electric Co.*



### 116—Totally-Protected Motors

Reliance Totally-Protected ac motors from 1 through 125 hp are discussed in new four-page, two-color Bulletin B-2506. Photos, drawings, and terse, easy-to-read copy explain the importance of total protection to motor performance. Gives availability of new NEMA large-frame sizes. *Reliance Electric and Engineering Co.*



### 117—Explosion Proof Motors

Bulletin 1200, "Explosion Proof Motors," by Fairbanks, Morse and Co., discusses nonventilated, and fan cooled motors and describes rotors and stators. Bulletin is completely illustrated and shows an exploded view of type KZCX motors. Bulletin also gives complete table of dimensions and frame sizes. *Fairbanks, Morse and Co.*



### 118—Dry Type Transformers

Bulletin S-202-B covers a complete line of dry type transformers for indoor use. Available in ratings through 500 kva or larger and voltages through 4800 volts, made in both Class A and Class B and Class H insulation. The Class A type are compound filled in ratings through 15 kva and 600 volts. *Standard Transformer Co.*



### 119—Control Cables

Booklet DM-5704 is complete manual on Anaconda Control Cable. It shows typical installations, points out trends in automatic control, offers a guide for every control cable application, and provides complete property and construction information on Anaconda rubber and thermoplastic control cable. *Anaconda Wire & Cable Co.*



### 120—Electrical Conduit

First book ever prepared on the subject of Underwriters Laboratories approved corrosion resistant wrought iron electrical conduit. Discusses protective properties of finished conduit: basic wrought iron composition, sherardizing and MVC-1 acid resistant vinyl enamel coating. Dimensions. *National Electric Products.*



### 121—Motor Starters

Manual starters, magnetic relays, contactors and starters, two-speed starters, combination starters, reduced voltage starters, and push buttons and stations are all included in 72-page catalog "Motor Controls." Also includes parts list, heater tables, and motor charts. Specifications and dimension drawings. *The Arrow-Hart and Hegeman Electric Co.*



### 122—Silicone Insulated Motors

Case histories describing how increased reliability and greater overload capacity were achieved by applying silicone insulated motors are detailed in six-page brochure 10-104. Applications ranging from small integral horsepower motors on processing lines through large power plant auxiliary drives are evaluated. *Dow Corning Corp.*



### 123—Supervisory Control

Bulletin GEA-6603 discusses the application, design, and construction of supervisory control equipment. An all-relay, space-code selector system with automatic check-back, this equipment operates over a single communications channel, and may be applied where direct-wire control was formerly deemed necessary. *General Electric Co.*



### 124—Interrupter Switches

Bulletin 1610A, 24 pages, describes and illustrates arc-chute type interrupter switches, fused and unfused, for switching feeder circuits. Usually metal enclosed, the switch can be wall mounted, free standing, or grouped with common bus. Switches can close in on moderate faults. *R & IE Equipment Div., I-T-E Circuit Breaker Co.*



### 125—Bus Conductor Handbook

280-page handbook presents facts and figures vital to anyone responsible for engineering of bus installations. Contains 69 graphs, tables, and photographs, presenting essential information in easy-to-read, readily usable form. Shapes, design, reactance, capacities, deflections, joints, and installation are covered. *Aluminum Company of America.*



### 126—Electrical Connections

Completely new 104-page electrical connection catalog covers exothermic method of welding copper to copper or steel without an outside source of heat. All types of connections for cable, ground rod, cable to steel surface, cable to bus bar and tube, bus bar single or multiple, tubular bus bar, and studs are illustrated. *Erico Products, Inc.*



### 127—Transformers

Bulletin 300 contains complete information about the Hevi-Duty control circuit transformers. Regulation curves for selecting the proper transformer size are given along with wiring diagrams, dimension drawings, weights and dimensions, ordering information, a table of impedances, and load power factor. *Hevi-Duty Electric Co.*



### 128—Electrified Concrete Floors

This 32-page manual was written specifically for structural and electrical engineers. It describes how precast fire-resistant Flexicore concrete floors are used for low rise and high rise buildings, and how the hollow cells in the floor are used for the installation of underfloor electrical distribution. *The Flexicore Co., Inc.*



### 129—Air Interrupter Switches

Bulletin 152 lists and illustrates a complete line of dry-type and liquid-filled switches through 14.4 kv. Units offer Auto-Speed interruption and automatically produced interruption that occur at the same point in the switching operation and take  $\frac{1}{2}$  cycle. Ratings, dimensions, and specifications are given. *Electrical Engineers Equipment Co.*



### 130—Technical Data

78-page catalog contains complete sections on technical data, engineering and research facilities, and cost and time studies. Technical data catalog tells the story behind the AMP terminal you specify for your client's requirements. This bulletin is well illustrated and includes graphs and case studies of actual installations. *AMP Inc.*



### 131—Industrial Wired Television

Bulletin 2140 describes Model 500 closed circuit television camera system . . . compact and complete for industrial use. Camera is self adjusting to compensate for wide variations in scene brightness. Weatherproof housings available for outdoor use. Picture viewed on Utilivue monitor or TV receiver. *Diamond Power Speciality Corp.*



### 132—Plug-in Busway

New 100-ampere, plug-in Flex-A-Power® busway known as the Type DH and available in both three- and four-pole construction, is the subject of a new 12-page bulletin. Listed in the bulletin are features, ratings, description, dimensions, weights and guide-form specifications. *General Electric Co., Trumbull Division.*



### 133—Mobile Industrial Lighting

16-page bulletin UT-650 discusses Bulldog Universal Trol-E-Duct, a flexible system for mobile industrial lighting and light-duty power supply. Trol-E-Duct provides perfect lighting for any industrial situation and saves man hours and maintenance costs. Ample illustration adds to the bulletin's value. *Bulldog Electric Products Co.*



### 134—Secondary Unit Substations

Twenty-page bulletin 9004-A on secondary unit substations describes many features such as lower cost, complete flexibility, and space saving. Photos and charts of construction and application details are furnished for units with standard kva ratings covering all types of indoor and outdoor substations. *I-T-E Circuit Breaker Co.*



### 135—Circuit Breakers

Bulletin 1604-A. Fully illustrated bulletin covering new K-Line low-voltage power circuit breakers. Breaker is spring operated for quick make manual or electrical operation. Ratings are 15 through 1600 amperes continuous; 15,000 to 75,000 amperes interrupting. Available for 600-v ac and 250-v dc. I-T-E Circuit Breaker Co.



### 136—Distribution Centers

New 16-page illustrated bulletin, GEA-6619, gives complete details on General Electric's new dry-type integral distribution centers, tells how one-piece construction saves space, simplifies specifying, ordering, and installation. Model numbers, dimensions, and choice of incoming line components are given. General Electric Co.



### 137—Control Centers

Catalog SM-244, 16 pages, describes in detail the modern method for centralizing electrical power distribution and motor control equipment for industrial applications. It also contains suggested ideas for control specifications, and gives a simplified selector for use in control center layout and planning. Square D Company.



### 138—Dry Type Transformers

"Engineering Data on Sound Levels of Dry-Type Transformers" compares various noises with decibel readings. It has a chart comparing decibel readings with percentage of noise reduction and gives NEMA standards of various types and sizes of transformers and the decibel rating of Sorgel dry-type transformers. Sorgel Electric Co.



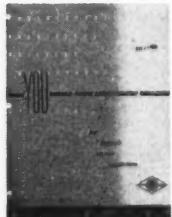
### 139—Plug-In Circuit Breakers

Catalog 1-106-A features STABREAKER, the new plug-in AB circuit breaker for lighting and power distribution panelboards. Directions are given on how to select components for STABREAKER distribution panelboards. Panel capacities and dimensions, knockout data for top and bottom, and application data are given. Federal Pacific Electric Co.



### 140—Switchgear

Twenty-four page bulletin 7004C covers indoor and outdoor switchgear. Comprehensive drawings and charts are designed to assist you in planning. Rated 7.5 and 15 kv through 200 amps continuous and 750 mva interrupting. Bulletin shows convenient arrangements for control and auxiliary equipment. I-T-E Circuit Breaker Co.



### 141—Branch Circuit Protection

"What You Should Know About Circuit Breakers for Branch Circuit Protection," 16-page manual 101, explains ways of protecting your client from fire, equipment damage, excessive wiring costs, needless interruptions, and wasted time. How fully magnetic circuit breakers provide this protection is pointed out. Heinemann Electric Co.



### 142—Cartridge-Type Terminals

AMP's entirely new termination method for aluminum wire is contained in new 24-page catalog. New "cartridge-type" terminals inhibit oxidation, provide insulation support, reduce effects of cold flow, control heat rise, and assure even current distribution to all wire strands by symmetrical confined crimp design. AMP, Inc.



### 143—Package Unit Substations

Eight-page bulletin covering package unit substations explains the advantages that substations offer when used in modern electrical systems. It shows a complete line of Square D equipment that has been designed to meet the needs imposed by modern systems, both high voltage and low voltage. Square D Company.



### 144—Electrical Equipment Guide

Catalog 110 is an easy guide to modern electrical control and distribution equipment. It includes, drawings, specifications, dimensions, and other pertinent engineering data on circuit breakers, panelboards, safety switches, industrial motor controls, bus and trolley duct, switchboards and switchgear. Federal Pacific Electric Co.



### 145—Disconnectors

Bulletin 140, 36 pages, describes 3E Isolators for disconnecting equipment and cables, in ratings up to 15,000 v and 1200 amp. It lists points to be considered when ordering, shows the units in typical applications, and gives dimensional drawings, cutaways, and specifications for the various types. Electrical Engineers Equipment Co.



### 146—Modern Wiring Devices

Eight-page illustrated catalog, "P&S Modern Wiring Devices," describes the P&S Roto-Glo quiet switch and highlights some of the outstanding P&S grounding outlets, weatherproof outlets, lampholders, Alabax fixtures, and the Despard line of interchangeable devices. A list of P&S representatives is furnished. Pass & Seymour, Inc.



### 147—Fuseology

Tells what to do when fuses blow. Where to look for trouble that caused fuses to blow. What to do after you have found the trouble. How to select right type of fuse for various circuits. How to save material and cut costs of motor installations. All included in this bulletin. Bussmann Mfg. Div., McGraw-Edison Co.



### 148—High Voltage Insulation

Bulletin EB-27-2 deals with development and properties of butyl rubber high-voltage insulation. Explains corona formation and differences. Detailed charts and graphs show heat and ozone resistance, high-voltage properties, dielectric strength, mechanical and electrical moisture absorption, impulse breakdown. Anaconda Wire & Cable Co.

## HEAT EXCHANGERS AND WATER HEATERS



### 149—High Pressure Closures

Bulletin 5.6K1, four pages, describes high pressure closures for Ross feed-water heaters and other high pressure, high temperature exchangers. Design details are illustrated by photos and cross sections. Text discusses simplicity of design, safety factor, and ease of removal. *Ross Heat Exchanger Div. of American-Standard.*



### 155—Heat Transfer Manual

This technical data manual defines and describes Tranter's four different Plate-coil styles, employing graphic dimensions. Features and applications are also discussed and typical layouts are pictured. Calculations and charts computing pertinent temperature information are given as are tables concerning sizes and capacities. *Tranter Mfg. Inc.*



### 150—Preheater for Small Boilers

The important points to consider in selecting a preheater for use with small boilers (25,000 to 250,000 lbs per hr) are discussed in four-page bulletin on the new package Ljungstrom air preheater. How use of a preheater saves fuel, increases boiler output and reliability, and permits use of lower grade fuels is explained. *The Air Preheater Corp.*



### 151—Storage Water Heaters

"Storage Water Heaters," 48-page catalog 19, gives construction details, storage and heating capacities, dimension tables, and standard specifications for steel, copper-lined, copper silicon, cement-lined, clad-galvanized, and Lo-Flo storage water heaters. Typical piping diagrams are included for easy reference. *The Patterson-Kelley Co., Inc.*



### 156—Hot Oil Heaters

Brochure RE-342 describes the operation, performance, and product features of hot oil heaters for industrial and commercial applications where low pressure temperatures up to 600 F are needed. Specifications cover the type of fuel, capacity of burners, Btu input and output, and other pertinent details of six standard models. *Bros Inc.*



### 157—Spray Type Heaters

Bulletin WC-112 "Packaged Degaerating Heaters, Spray Type," describes the Graver two-stage degaerating heater furnished in a compact unit for the smaller steam generating plant in sizes up to 90,000 pounds per hour. Details of construction, internal design, and distinctive features are also included. *Graver Water Conditioning Co.*



### 152—Heat Exchangers

Bulletin HE-6 is a 28-page pictorial presentation of standard and custom built heat exchangers constructed from steel, non-ferrous materials, or alloys to meet every temperature, pressure, or vacuum service in conformity to all codes. Features of design and construction are given for each type of heat exchanger. *Henry Vogt Machine Co.*



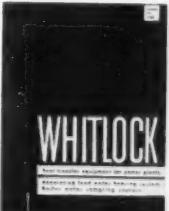
### 158—Corrosion Resistant Linings

"Special Corrosion Resistant Linings for Hot Water Storage Tanks and Heaters," four-page folder 514, describes plastic coatings and linings, cement linings, clad steel, and galvanizing for hot water storage tanks and heaters. Suggested uses for each type of lining are listed with advantages. *Richmond Engineering Co., Inc.*



### 153—Zero-Oxygen Deaerators

Bulletin 575, eight pages, fully describes the new fully vented Schaub Zero-Oxygen Deaerator, which is guaranteed to remove effectively oxygen down to .005 cc per liter. The "whys" and "hows" of deaeration are covered as are the descriptions of component parts used in conjunction with the system. *Fred H. Schaub Engineering Co.*



### 159—Degaerating Systems

Eight-page bulletin 120A describes the need for deaerating feedwater in steam plants and explains the spray and boil-off types of deaerating feedwater heating systems available in economical standard units. Tables are given for determining size of system required and typical installations are shown in flow diagrams. *The Whitlock Mfg. Co.*



### 154—Storage Heaters

"Reco Hot Water Storage Heaters," 18-page bulletin 512, covers both horizontal and vertical heaters, submerged water heaters, and condensate coolers and economizers. It gives specifications, construction details, dimension and installation diagrams, capacity and dimension charts, and lists special alloys. *Richmond Engineering Co., Inc.*



### 160—Feedwater Heaters

Feedwater Heaters, for Central Stations and Industrial Power Plants, is title of 16-page Catalog by Alco. Catalog gives description of Alco high pressure closure and tells how improved heaters give you greater value. Catalog completely illustrated. Includes cutaway detail drawings. Gives dependable, efficient, and economical service. *Alco Products, Inc.*

## HIGHWAYS, BRIDGES AND STREETS



### 161—Bridge Flooring

This 32-page booklet contains complete descriptions, specifications, drawings, and design data covering all types of AmBridge I-Beam-Lok. Also included are details of flooring applications plus a brief discussion showing how Composite Tee-Beam Action can be used with I-Beam-Lok. *American Bridge Div., United States Steel Corp.*



### 162—Mackinac Bridge

Exclusive 12-page reprint of part of Dr. D. B. Steinman's new book relates many little known facts about the building of the Mackinac Bridge. The text is couched in layman language, permitting the most casual reader a rare insight into the complexities of an outstanding engineering triumph. New. *Intrusion-Prepakt, Inc.*



### 163—Suspension Systems

Contains information required for the selection and preparation of specifications for wire, strand and rope on guyed structures and suspension systems of all kinds, except major suspension bridges. It also offers direct engineering consultation in the preparation of specifications. 22 illustrated pages. *John A. Roebling's Sons Corp.*



### 164—Boring-Jacket Method

Folder 11656 describes how to eliminate costly surface interruptions when installing underground conduits by the Armco Boring-Jacket method. Sketch illustrates the method. Equipment and procedure detailed with possible lengths under normal conditions. Folder is illustrated. *Armco Drainage & Metal Products, Inc.*



### 165—Highway Railings

One of the most complete catalogs on this subject. Contains: specifications, design data, details for 47 sizes and types of cast posts, dimensions and properties of rails and other components. A valuable handbook for the consulting engineer engaged in the design of highway railings. Forty pages. *Michael Flynn Mfg. Co.*



### 166—Toll Bridge Project

This offering is a reprint of an article by Leonard C. Hollister, which appeared in *Civil Engineering*. Part I "Carquinez Toll Bridge Project" described the construction of the new 3-mile approach to the bridge. The present article describes the bridge itself (piers are now under construction). *United States Steel Corp.*



### 167—Hot Mix Asphalt Paving

"Specifications and Construction Methods for Hot-Mix Asphalt Paving" (Specification Series No. 1) brings together all recognized and proven types of hot-mix asphalt paving. By following this 96-page booklet, the engineer can prepare specifications that include physical dimension, quality, and financial investment. *The Asphalt Institute.*



### 168—Steel and Wire

"American Steel and Wire Products for Highways and Streets," is title of 44-page Catalog by U.S. Steel. Contents include: in the pavement, along the roadway, for prestressed concrete, for drainage, for tunnels and bridges, and for roadway repair. Catalog well illustrated. *American Steel and Wire Div., United States Steel Corp.*



### 169—Bridge Decking

Irving decking catalog F-300 contains illustrations, descriptions, and engineering data on open metal grid bridge roadways, with many of the advantages inherent in this type of bridge roadway, such as lightweight, cleanliness, drainage, safety, durability, strength, traction, and economy. *Irving Subway Grating Co., Inc.*

To order personal copies of these bulletins, please fill out the card between pages 4 and 5 or 36 and 37.



### 170—Prestressed Concrete Wire

This comprehensive manual deals with Tufwire stress relieved wire and strand for prestressed concrete. It features widening application of both pre-tensioning and post-tensioning, and includes engineering data on methods of determining elongation values together with typical elongation curves and tables. *Union Wire Rope Corp.*



### 171—Suspension Systems

Fully describes possible adaptations of basic wire rope suspension bridge principles including suspended roofs, guyed towers, and aerial tramway systems. Also outlines special engineering services offered by Roebling for all types of wire rope suspension systems. 22 illustrated pages. New catalog D-933. *John A. Roebling's Sons Corp.*



#### 172—Prestressing Concrete

Two of the most common methods of computing elongation are outlined. One is based upon tensioning 70 percent of ultimate strength; the other upon application of pounds per initial load. A typical load elongation curve on  $\frac{3}{8}$ - and  $\frac{7}{16}$ -in. strand is included as well as tables and charts on physical properties. *Union Wire Rope Corp.*



#### 173—"T-1" Article Reprint

New reprint "Welding U.S.S. 'T-1' Steel Speeds Bridge Construction," from *The Iron Age*, Oct. 10, 1957 issue is now available. Welding highly stressed structural components for the new bridge to span San Francisco Bay posed problems in equipment, setup, and technique. Solutions are discussed in this reprint. *United States Steel Corp.*

### INSTRUMENTS AND CONTROLS



#### 174—Mill Regulators

Bulletin K-2503 describes new all-electronic mill regulator especially engineered for continuous process industries, to control speed, voltage, and tension. Dual-circuitry principle makes unit fail-safe; if one half of panel is inoperable, other half carries full load to carry on all operations. *Reliance Electric and Engineering Co.*



#### 179—Liquid Level Controls

Catalog Section VI gives complete specifications, ratings, and dimensions of Magnetrol's line of external float gage liquid level controls for higher pressures and temperatures: standard units for pressures to 5000 psi and special units for higher pressures. Equipped with mercury or micro switches or pneumatic pilot. *Magnetrol, Inc.*



#### 175—Temperature Regulators

Ranges, operating temperatures, dimensions, and accessory equipment of Powers' No. 11 self-operating temperature regulators are described in Bulletin 329. Typical applications and charts for selection of regulator type and valve sizes are also included. Regulators protected from overheating. *Powers Regulator Co.*



#### 180—Density Tester

Bulletin CN-980 contains complete information on the new Volumetrae, a self-contained, lightweight, and accurate unit designed for fast and simple field or laboratory in-place density tests of soils. The unit provides a positive test method for use in embankment control and subgrade compaction projects. *Soiltest, Inc.*



#### 176—Transmitters and Indicators

New 28-page catalog describes a full line of Synchro Transmitters and Indicators used for aircraft. Shows dials and instruments in actual size; catalogs those made to MIL specifications. One inch miniature indicators, engine mounted transmitters are among the new developments. *U. S. Gauge Div., American Machine & Metals, Inc.*



#### 181—Tank Contents Gaging

Suggested specifications for tank contents gaging systems—hydraulic, hydrostatic, and direct reading—are given in bulletin 463A. Model selection guides and pictorial diagrams are included, along with a list of liquids successfully gaged by Liquidometer systems, and principles of operation of each gage. *The Liquidometer Corp.*



#### 177—Flow Tubes

The Gentile Flow Tube, now in use for metering water, air, steam, oil, jet fuel, hydrocarbon liquid, clay, slurry, raw sewage, brine, methanol vapors, black liquor, casing head gas, coke oven gas, argon, helium, sludge, white water, and paper stock is described in six-page bulletin FT. Sizes start at  $\frac{3}{8}$  in. I.P.S. *Foster Engineering Co.*



#### 182—Heating and Cooling Controls

Mercoid automatic controls for heating, refrigeration, air conditioning, and industrial applications are described in 56-page catalog 858. The booklet is completely indexed by subject and catalog number and gives all pertinent engineering data, specifications, dimensions, ranges, and temperature and pressure charts. *The Mercoid Corp.*



#### 178—Heated Gages

Four-page Data Unit No. 237 describes and illustrates Jerguson Heated Liquid Level Gages designed for use with liquids requiring heat to speed the flow and to prevent freezing. Contains complete details on external and internal models including design features, materials, pressure groups, and sizes. *Jerguson Gage & Valve Co.*



#### 183—Pneumatic Controller

53P-4000 describes improved Model 53-P motion-balance pneumatic controller with unique "regenerative feedback" circuit. Pneumatic and mechanical signals can be handled by changing one subassembly. Basic design is used with miniature or conventional instruments. Complete selection of controller modes. *Fischer & Porter Co.*



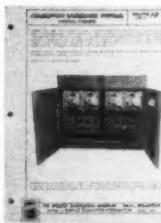
#### 184—Compression Tester

Bulletin AP-350 illustrates and describes the Versa-Tester, a multi-purpose compression testing machine ideal for research or routine laboratory testing. Accurate tests requiring capacities to 30,000 lb can be performed simply and quickly on soils, bituminous materials, mortar, concrete, plastics, metals, and wood. Soiltest, Inc.



#### 185—Liquid Level Indicators

How the Eye-Hye gage helps protect the power plant from liquid level accidents is explained in four-page catalog 500, Sec. CO. A diagram shows the flexibility of placement possible: near boiler, tank, or other vessel, or on instrument panelboard, nearby or considerably removed from the boiler. The Reliance Gauge Column Co.



#### 186—Safeguard Systems

Bulletin AP 5/1 deals with complete control cabinets for any type of combustion system. Illustration shows W4-FP4 designed to provide pre-purge period and semi-automatic ignition of pilot and main flame for four burners in single boiler. Picture of cabinet included. Prices will be furnished on request. The Webster Engineering Co.



#### 187—Flow Controls

10-page booklet, "The Power Plant of Tomorrow," describes the use of Magnetrol liquid level and flow controls at the experimental boiling water reactor, Argonne National Laboratories. Actual photographs from inside the reactor and a simplified flow diagram explain complete function of the 16 Magnetrols installed. Magnetrol, Inc.



#### 188—Solenoid Valves

New 36 page ASCO condensed valve catalog 202 provides an up-to-date listing of the latest in 2, 3, and 4 way solenoid valve designs, for automatic control of liquids and gases. Includes a corrosion resistant rating chart, valve selection guide, engineering information, flow nomographs, and list prices. Automatic Switch Co.



#### 189—Automatic Regulators

4-page condensed catalog outlines the range of Foster Automatic Regulators for the control of pressure, temperature, liquid level, and flow; also flow tubes, an impact-type head meter designed for accurate measurement and regulation of fluid flow. Catalog contains nine complete tables of specifications. Foster Engineering Co.



#### 190—Graphic Panels

Bulletin 357-1 contains a standard color code for Powers' custom-made line of Graph-O-Matic panels. Illustrated are panel segments for heating, refrigeration, and fan systems. Stop-start switch with integral pilot light, pneumatic temperature gauge, and pneumatic positioning switch are also pictured. Powers Regulator Co.



#### 191—Industrial Tank Gages

Bulletin 6004 describes a new line of remote reading industrial liquid depth gages. It presents comprehensive information on operation and design of the Petrometer Series 1400 Gauges, as well as on the method of selecting the right gage for remote indication of depth or quantity of liquids in tanks and pressure vessels. Petrometer Corp.



#### 192—Pressure Reducing Valve

24-page catalog No. 113 covers type-PRV pressure reducing valve for high and low pressure air distribution systems. Detail dimension drawings, plus complete tables and graphs on sound are included. Tables and drawings given for the acoustic duct lining. List prices are given for each size. Tuttle and Bailey Div., Allied Thermal Corp.



#### 193—Low Priced Computer

A 12-page brochure, describes the LGP-30—a serial, single address, fixed point, binary, stored program digital computer that fulfills the need for a small-sized, reliable, and low-priced scientific computing device. The LGP-30 has an integrated logical design that utilizes each component for many operations. Royal McBee Corp.



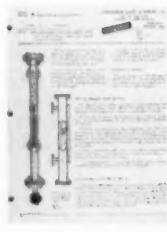
#### 194—Industrial Gauges

16-page catalog 305 introduces the entirely new USG "A"-Line of general purpose industrial gauges, which conform to or exceed ASA Grade A standards. Various designs and sizes, for use in air, oil, steam, refrigerants, hydraulic or ammonia systems, compressors, diesel engines, etc. U. S. Gauge Div., American Machine & Metals, Inc.



#### 195—Photo Control System

Bulletin 76-3311 describes the operation of photo control system for the control of inside space illumination. Two-position control and multi-stage control. Other points discussed include speed of response, location of photo tube, installation, calibration, and typical performance of the whole system. Minneapolis-Honeywell Regulator Co.



#### 196—Magnetic Gage

Data Unit No. 306 describes and illustrates the new Jerguson magnetic gage which is designed for gaging liquids under conditions where glass, gaskets, and threads cannot be used due to the high potential danger of explosion or fire if the slightest trace of gas escapes. Dimensions and specifications are given. Jerguson Gage & Valve Co.



#### 197—Flow Meters

Catalog 10D1416 describes new Fischer & Porter Magnetic Flowmeter for measuring flow rate of "difficult" liquids without adverse effects. Major features are: unrestricted flow, and manual adjustment for setting any desired flow rate at full scale. Meters in the  $\frac{1}{2}$ -in. size handle as low as one gpm. Fischer & Porter Co.

## INSULATION



### 198—Pipe Insulation News

News magazine published quarterly by the manufacturer of Gilsulate insulation for underground hot pipes carries stories and articles dealing with problems of insulating these pipes. This issue (third) describes method of mining and quality control used in case histories producing Gilsulate. *American Gilsonite Co.*



### 199—Acoustical Board

4-color brochure shows and describes Ultracoustic Ceiling Board—a new type of incombustible glass fiber ceiling board with travertine surface finish for grid-type suspended acoustical ceilings. Complete technical data, color photos, packaging, and shipping information contained in catalog. *Gustin-Bacon Manufacturing Co.*



### 200—Mono-Block

New brochure, 8 pages on B-H Mono-Block, a spun mineral wool block with temperature range to 1700 F, and improved super powerhouse cement, an improved insulating-finishing cement giving 30% greater coverage, harder, whiter finish surface. Brochure gives data, specifications and application details. *Baldwin-Hill Co.*



### 201—Foamglas Insulation

8-page booklet presents the physical properties of the unique cellular glass insulation; sizes and shapes available; and suggested thicknesses required for temperatures ranging from -50 F to 800 F. Condensed recommended specifications and photographs of applications make a good reference booklet. *Pittsburgh Corning Corp.*



### 202—Insulating System

New low-cost insulating system design for use in good ground and water conditions, described in four-page brochure Z-12. System employs no structural base or water-proofing envelope. Folder cites insulating and structural properties, gives specifications, drawings, photos, and gives location of dealers. *Z-Crete Div., Zonolite Co.*



### 203—Pipe Protection

"Where to Use Tapecoat," eight-page bulletin, presents applications and data on Tapecoat coal tar coating in tape form for double-wrapping on pipe, pipe joints, mechanical couplings, conduit, cable and insulated piping, above and below ground. It includes table of coverage for various sizes and presents case histories. *The Tapecoat Co.*



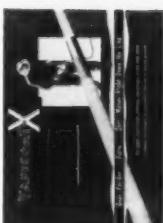
### 204—Lagging Adhesives

Swift's lagging adhesives for heating and process piping, and the 12 important advantages that they offer, are described in four-page folder 9283. They are recommended for bonding shells of molded insulation to themselves or pipes; as binder for loose insulation; and to adhere and size lagging cloth. *Swift & Co., Adhesive Products Dept.*



### 205—Aerolag Insulation

4-page file No. 37-D-1-2 discusses Johns-Manville aerolag pipe insulation. Provides economical service for low pressure steam and hot water lines, and dual-temperature piping to 350 F. Gives advantages and tells in 3 easy steps how to apply. Last page gives complete specification and dimension tables. *Johns-Manville.*



### 206—Pipe Protection Tape

Tapecoat-X, the coal tar coating in tape form for single-wrap application, is described in this four-page bulletin. Illustrations and data point up economies in time, material, and labor resulting from extra thickness of coal tar available for protecting pipe, pipe joints, fittings, couplings, and tanks. *The Tapecoat Co.*



### 207—Duct Insulation

New brochure on B-H Duct Insulation, 4 pages, an economical, quickly applied semi-rigid spun mineral wool duct insulation available plain, coated or with factory applied vapor barrier. Brochure gives data, specifications and applications. Gives product and packaging information for 24 and 48 in. *Baldwin-Hill Co.*



### 208—Silicone Products

Over fifty silicone products, including electrical insulation, are described in new 16-page brochure 1-113. Included are high temperature paints and masonry water repellents; silicone lubricants for extremely high and low temperatures. Advantages of specifying silicone insulated motors and transformers shown. *Dow Corning Corp.*



### 209—Insulating Concrete Systems

12-page booklet Z-1 on insulating concrete systems for underground hot pipes gives thermal and structural characteristics; detailed drawings; proper control of pipe expansion; sequence of installation; general design data; specifications; and gives a list of cities who handle "Z" Crete insulation. *Z-Crete Div., Zonolite Co.*



#### 210—Pipe Insulation

"Snap-On Pipe Insulation," eight-page booklet, describes characteristics and application data for one piece, fine-glass pipe insulation. Application specifications cover: plumbing, heating, insulation of valves and fittings, cold piping, and dual temperature outdoor piping. Charts show recommended thicknesses. *Gustin-Bacon Mfg. Co.*



#### 211—Underground Pipe Insulation

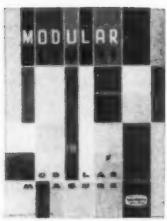
Four-page illustrated brochure discusses the problems of underground pipe insulation and explains how Gilsonite's special properties overcome them. On-the-job photos illustrate ease and speed of application. Thermal coefficients of transmission and other technical data and specifications are given. *American Gilsonite Co.*

### LIGHTING



#### 212—Shielding Fixture

The Twosome by Smithcraft, a high-quality, low-cost luminaire, for all types of commercial interiors. The Twosome's compound shielding provides 45° x 45° in a very shallow unit (only 3½" deep) with no dark center streak. Available with Plastic Louvers, Ribbed Skytex Glass, and Flanged Polystyrene. *Smithcraft Lighting, Inc.*



#### 213—Modular Lighting

OD-689. Modular lighting is coordinated with the ceiling function, appearance and assembly. Contains ceiling indexing system which correlates six basic types of Troffers and Mobilex with more than 90 suspension systems. Fixtures have new improvements in keeping with architecture's trend. *Day-Brite Lighting, Inc.*



#### 214—Side Panels

Specification sheets COM215 through 218 feature lighting fixtures with interchangeable side panels—indirectly illuminated metal side panel, solid metal, or ribbed polystyrene. Same fixture can be mounted individually or in continuous rows, with standard stem sets or with either rapid start or slimline. *Electro-Silv-A-King Corp.*



#### 215—Louvered Lighting

This fully illustrated brochure describes Lightolier's Louvron line of louvered fluorescent lighting. A special section details construction of the Permalux unbreakable luminous side panels. Design and specification features are given for both two and four-light sizes and four and eight-foot lengths. Lighting data included. *Lightolier, Inc.*



#### 216—Over-All Ceiling Lighting

This packet of two and four page brochures features the GrateLite Louver Diffuser for over-all ceiling lighting. It includes full installation, performance, and construction data; description of the new Una-Tee suspension system; time-saving estimating tables; and GrateLite ceiling layout information. *The Edwin F. Guth Co.*



#### 217—Lighting Fixtures

Folio 58-1, a 12-page brochure, gives a full description of McPhilben cast aluminum special purpose lighting fixtures for institutions, industrial and public buildings. This brochure is divided into three sections: weather-tight-vaportight lighting; exits and directionals; and general lighting. *McPhilben Lighting Co.*



#### 218—Catalina Fixture

Bulletin AD-6776 fully describes the Catalina lighting fixture, an entirely new concept in uninterrupted flowing lines of light, adaptable for stores, offices, and commercial installations. Adaptable to either surface or suspended mounting and designed to harmonize with any interior. Available units table. *Benjamin Electric Mfg. Co.*



#### 219—Ballast Sound Rating

"A General Electric Report on Ballast Sound," GED-3164, gives an inside story on General Electric's ballast sound rating system. This new eight-page bulletin tells the reasons why it's just as important to specify the sound level as well as the light level of fluorescent lamp installations for a satisfactory result. *General Electric Co.*



#### 220—Emergency Lighting

Standard's 20-page catalog No. 243A describes their emergency lighting systems. Besides fully describing these Underwriters' Laboratories approved systems featuring 100% electrical supervision, the new catalog contains information and specifications on all components, fixtures, and exit signs. *Standard Electric Time Co.*



#### 221—Lamp Ballasts

Bulletin 1203 includes wiring diagrams for fluorescent lamp ballasts. Handy index includes lead lengths, dimensions, and lamp type for over 150 popular ballasts. Bulletin includes 9 schematics under the title of preheat, 6 under slimline and instant start, 9 under rapid and quick start, and 4 under-circuited. *Advance Transformer Co.*

#### 222—Prismatic Louver Lens

This is a packet of two- and four-page brochures describing the Prismoid-Gratelite, the new prismatic louver lens for lighting fixtures. The bulletins include fixture photographs, light curves, coefficients of utilization, descriptive data, suggested specifications, types of plastics available, and special features. *The Edwin F. Guth Co.*



#### 223—Recessed Lighting

This 32-page brochure describes the complete Calculite line of decorative and functional recessed incandescent lighting. Construction features are detailed with special emphasis on the Torsionite(R) spring fastener, Colouvere(R) lens and Alzak reflector. Full lighting, installation, and ordering data are also included. *Lightolier, Inc.*



#### 224—Dual Fixture

Combination fixture diffuses conditioned air and provides illumination simultaneously. Adaptable to any drop-type ceiling, it simplifies engineering, contributes to attractive interior design. Air diffuser is located inside the fixture, using the pressure displacement principle, instead of high-velocity. *Benjamin Electric Mfg. Co.*



#### 225—Aluminum-Framed Fixtures

Architecturally pleasing and classic in its lines, the new Smithcraft Civic is an attractive, aluminum-framed fixture that harmonizes perfectly with any decor, adding a permanent luxury-look. Describes Civic's sturdy construction, 100 percent down-lighting, simple installation and maintenance features. *Smithcraft Lighting.*



### MATERIALS HANDLING AND STORAGE

#### 230—Electric Cranes

Bulletin C-54 deals with overhead electric traveling cranes. Illustrates and describes construction features of trolleys, girders, bridge drives, end trucks and cabs. Includes description of "Electronic Stepless Control;" a-c crane control which eliminates most relays, contractors, and interlocks of a-c controls. *Harnischfeger Corp.*



#### 231—Steel Derricks

Advantages gained by using Whirlettes—full revolving, self contained steel derricks—are listed in four-page folder MP-49. The hoist is mounted on the rotating structure and only one foundation is necessary. No guy lines or stiff legs are required. Booklet gives specifications, and illustrates typical uses. *Clyde Iron Works, Inc.*



#### 226—Ballast Overheating

General Electric engineers have answered several important questions about fluorescent ballast overheating in this new eight-page bulletin, "Let's Talk About Ballast Heating," GED-3328. The bulletin describes in easy-to-read language the causes, effects, and most important, the solutions to overheating. *General Electric Co.*



#### 227—Downlights

Folio 57-5 describes the McPhilben line of recessed weathertight downlights. This 4-page brochure gives full details on sizes, wattages, features, and applications of McPhilben's cast aluminum recessed weathertight downlights. Complete listings of sales representatives. Tables and illustrations included. *McPhilben Lighting Co.*



#### 228—Architectural Elements

Available in 6 sizes—1' x 4', 1' x 8', 2' x 2', 2' x 4', 2' x 8', 4' x 4', with 6 different enclosing elements including Daytex plastic, 6024-DB Controlens, Cleartex, Lumatex, Pattern 70 glass and drop Crestex plastic. Units available for 4-foot rapid-start and 2-foot trigger-start lamps; 3 1/4-in. unit depth. *Day-Brite Lighting, Inc.*



#### 229—Lighting Newsletter

A new RLM service for those interested in industrial lighting is publication of a newsletter covering developments in standards, new specifications, and progress reports. Vol. 1, No. 3 covers forthcoming RLM specifications for fluorescent units for 800 milliamp lamps and data on efficiency of SD-1 units. *RLM Standards Institute, Inc.*



#### 232—Automatic Conveyor Scales

Bulletin 375 describes the Merrick Model E Weightometer and its uses for automatic continuous in-transit weighing of bulk materials over an existing belt conveyor. Specifications and drawings of typical conveyor arrangements shown. Other types of automatic weighing machines also are described in some detail. *Merrick Scale Mfg. Co.*



#### 233—Sand and Gravel Jigs

Bulletin 892 features a low cost method of removing foreign materials from sand and gravel with the Jeffrey heavy duty jig which can also be used in concentration of ores. Capacities up to 75 tons per hour. Specifications, diagrams with dimensions, illustrations, and operation data are included for the units. *The Jeffrey Mfg. Co.*





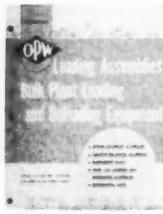
#### 234—Dump Bucket

Booklet 32783 describes a new dimension in earthmoving and materials handling. A side dump bucket for Caterpillar-built No. 933 (series C) and No. 977 (Series E) Traxcavators provides the answers, reduced cycle time, and close quarters operation. Brief specifications are given for both machines. *Caterpillar Tractor Co.*



#### 235—Pneumatic Conveying

Spencer Bulletin 143-B describes pneumatic conveying with stationary and portable systems. A typical diagram of each type is given; also a chart of approximate capacities and photos showing various system components. Examples with illustrations of applications of pneumatic conveyors are shown. *The Spencer Turbine Co.*



#### 236—Loading Assemblies

Catalog F-32 R is a complete introduction to OPW's 21 models of Counter-Balanced and Spring-Balanced Assemblies for loading and unloading bulk fluids. 24 pages of specifications, illustrations, application data, components and recommendations describe the convenience and operation of equipment. *OPW Corp., Jordan Industrial Sales Div.*



#### 237—Conveyors & Collectors

Four-page general product folder entitled "Dracco Airstream Conveyors and Dust Collectors" describes complete line of pneumatic conveying and dust control equipment. Illustrations show how bulk materials handling and dust control problems have been solved. Folder contains guide to additional literature. *Dracco Corp.*



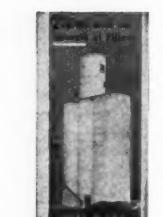
#### 238—Safety Electrification

New brochure No. 8-58 describes Insul-8-Bar enclosed conductor systems for cranes, monorails, moving machinery. Clearly demonstrates that Insul-8-Bar systems meet all safety and installation requirements of mobile electrification without the need for special parts or engineering. Brochure is liberally illustrated. *Insul-8-Corp.*



#### 239—Materials Handling Equipment

Bulletin 241, "Working for Profit in Every Industry," describes and illustrates the application of Whiting materials handling, foundry, railroad, and chemical processing equipment in metalworking, processing, transportation, and utilities industries. A 32-page pocket size edition includes a reply card. *Whiting Corp.*



#### 240—Vertical Bins

If you specify vertical storage construction for handling flowable bulk materials, this ten-page foldout will help you visualize how this company's Super-Concrete Stave Storage Bins might meet your requirements. The booklet contains photographs of typical installations, lists uses, and explains construction. *Neff & Fry.*



#### 241—Pneumatic Equipment

Bulletin G-3, "Fuller Equipment For The Process Industries," describes Fuller rotary compressors and vacuum pumps; inclined-grate material coolers; Fuller preheater, Humboldt suspension type; Fuller-Kinyon, Airveyor, and F-H Airslide conveying systems for handling dry, pulverized, granular, and crushed materials. *Fuller Co.*



#### 242—Screw Conveyors

Bulletin 957 explains how Flo-tube moves materials mechanically with simplified manual or automatic controls. Flo-tube moves chemicals, coal, gravel, salt, sand, sugar, wood chips, and similar materials from bins and piles to receiving hoppers or processing machines at predetermined rates, at any angle of incline. *Canton Stoker Corp.*



#### 243—Constant Weight Feeders

Bulletin 253, 16 pages, discusses feeding, proportioning, and batching problems in all types of industries. Various applications of the Model WS Feedo-weight and its principle of operation are described. Standard specifications, drawings, and capacities of this automatic continuous gravimetric feeder are given. *Merrick Scale Mfg. Co.*



#### 244—Storage Tanks

This four-page folder summarizes, through pictures, the many skills and services provided by Graver and its divisions. Storage tanks in many forms and process vessels for a very broad range of industries are shown. The folder includes mention of Graver's fabricating techniques, and specialized products. *Graver Tank & Mfg. Co., Inc.*



#### 245—Handbook

Materials Handling Handbook is the first complete, integrated guide to efficient handling of materials — whether in raw, in-process, or finished form. Covers principles, procedures, methods, systems, equipment, etc. Editor: Harold A. Bolz; Associate Editor: George E. Hagemann; with 84 contributing, consulting editors. *The Ronald Press Co.*



#### 246—Car Pullers

Ten-page bulletin L-6 shows capstan type car puller for moving cars a short distance using manila rope. Three styles of drum car pullers for heavy duty car moving, shuttle work, or for servicing very large areas are also listed, as well as barge movers for shifting barges back and forth during unloading. *Clyde Iron Works, Inc.*



#### 247—Stepless Crane Control

Principles of operation of the new P & H electronic stepless control for overhead traveling cranes are discussed in four-page bulletin C-53. Applied in conjunction with the standard P & H Magne-torque, this control is said to provide an ultimate in control and precision spotting in both lowering and hoisting. *Harnischfeger Corp.*



#### 248—Overhead Handling Systems

Bulletin M-32, "Ideas in Materials Handling," describes how the Whiting Trambeam overhead handling system takes materials from point to point faster and easier, saving time and money with every move. The 12-page booklet includes application drawings for production, shipping, receiving, warehousing, storage. *Whiting Corp.*



#### 249—Storage Bins

This four-page bulletin describes and illustrates construction of Neff & Fry's Super-Concrete Stave storage bins for industry. Lists of prominent users and varieties of materials are given, as well as tables of capacities in relation to bin diameters, heights, and weights of materials. Concrete roofs are discussed. *Neff & Fry.*



#### 250—Industrial Storage Silos

"Modern Industrial Storage Systems," 12-page brochure 4393, discusses the subject of storage for raw ingredients, semi-processed, or finished materials. The flexibility and adaptability of concrete silos is discussed. Descriptions of component parts and construction are supplemented with line drawings. *The Marietta Concrete Corp.*



#### 251—Elevated Water Tank

The ECHO, quarterly magazine of Graver Tank, features a story on the elevated water tank for the Village of Homewood, Ill. Among other articles — examples of Graver's services as a leading fabricator in steels and alloys — is a story of Graver-designed water treating equipment over the past 50 years. *Graver Tank & Mfg. Co., Inc.*

### MECHANICAL POWER TRANSMISSION



#### 252—Flexible Gear Couplings

Advantages and typical applications of flexible gear couplings are pictured and described in 16-page catalog C-4, "The Revolutionary New Sier-Bath Flexible Gear Couplings." Couplings are available in standard, vertical, mill-motor, floating shaft and spacer type, and in many special purpose types. *Sier-Bath Gear & Pump Co., Inc.*



#### 253—Transmission Products

Catalog 914 describes various transmission products used on elevating and conveying machinery and in other industrial machinery fields. 88 pages with diagrams, specifications, illustrations, operation data, and description cover different chains and drives, take-ups, gears, shafts, set collars, pillow blocks, and clutches. *The Jeffrey Mfg. Co.*

### PIPING, VALVES, AND PLUMBING



#### 254—Valve Catalog

24-page composite catalog on bronze, iron, steel, and alloy valves for controlling the flow of water, oil, gas, air, steam, and corrosive fluids. Lists pressure and temperature ratings and available sizes. Also shows flush bottom tank valves, lubricated plug valves, liquid level gauges, and other engineering specialties. *The Wm. Powell Co.*



#### 255—Heated Plug Valves

Bulletin AP-1057 deals with steam heated plug valves for handling asphalt and other viscous ladings. Description and other information on unique steam-jacketed base plate valve available in sizes  $\frac{1}{2}$  in. to 12 in., 175 lbs. WOG to 500 lbs. WOG including multiport styles. *W-K-M, Division of ACF Industries, Inc.*



#### 256—Pipe Expansion

Bulletin 31 describes and illustrates use of flexible ball joints in sizes from  $\frac{1}{2}$  inch to 12 inches for handling thermal expansion in high temperature power and plant piping. Joints are designed for any steam pressure, 0 to 750 psi, or higher. Diagrams, data, and photographs are included. *Barco Manufacturing Co.*



#### 257—Pyrex Pipe

"Pyrex Pipe for Drainlines . . . the modern way to handle corrosive wastes . . ." is title of 8-page bulletin PE-30. Bulletin tells why Pyrex drainlines solve your toughest chemical corrosion problems. Pyrex drainlines are low cost . . . easy and economical to install. Table and illustrations included. *Corning Glass Works.*



#### 258—Valve Comparison Chart

"OIC Diamond Anniversary Valve Comparison Chart," bulletin 194-R2, recently completed, covers the latest models of new valve designs manufactured by each company in the valve business. It lists, for the first time, a complete valve trim comparison table. The chart is arranged for easy cross reference. *The Ohio Injector Co.*



#### 259—Steel Valves

Catalog 12-G1, 8 pages, describes forged steel welded bonnet Univalves, 1500 and 2500 lb SP with integral stellite seat, stellited disk, chromemoly bodies with permanent or removable backseats. Dimensions, weights, pressure-temperature ratings, and applications. *Edward Valves, Inc., Subsidiary of Rockwell Mfg. Co.*



#### 260—Thermostatic Traps

Bulletin B-1205 describes the new Webster Series 80 float and thermostatic traps for pressures up to 150 psi. Traps are available in three sizes with  $\frac{3}{4}$  inch, 1 inch and  $1\frac{1}{4}$  inch connections and a corresponding range of capacities. The new design introduced in June, 1957 replaced the former series 79. *Warren Webster and Co.*



#### 261—Valves

Catalog No. 56 describes and illustrates the complete lines of Jenkins Diamond-marked bronze, iron, cast steel, and stainless steel valves recommended for every industrial, commercial, engineering, domestic, and plumbing and heating service up to 600 psi. Includes data on selection, installation, and maintenance. *Jenkins Bros., Inc.*



#### 262—Prefab Piping

Catalog No. 54 describes a complete line of welding fittings for pipe in sizes from  $\frac{3}{4}$ " to 36"—standard weight—extra strong, and of a variety of materials including steel, wrought iron, stainless steel, aluminum, etc. Exceptional facilities for fabricating piping to meet specific requirements are presented. *Midwest Piping Co., Inc.*



#### 263—Glass Pipe

44-page Catalog PE-3 covers Pyrex type "double tough" glass pipe and fittings. Catalog is broken down into three groups; design, engineering, and installation. Each group is completely discussed with illustrations, dimension tables, and detail drawings. General information tells why product is best. *Corning Glass Works.*



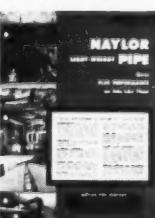
#### 264—Butterfly Valves

Bulletin 560 R, 16 pages, describes standard 25, 50, and 125-pound class butterfly valves for throttling control and shut-off of air, gases, liquids, and semi-solids. Specifications and dimensions on manual and automatic valves. Valves used in public utilities, industrial process, water supply, and waste treatment. *W. S. Rockwell Co.*



#### 265—Separators and Purifiers

Catalog No. 450 has been revised to provide additional information on entrainment separators for the removal of liquids and solids from steam, air or gas. Along with the separators is illustrated an extensive line of traps for draining this same material on these applications. Typical installations and charts. *Wright-Austin Co.*



#### 266—Lightweight Piping

Bulletin 507 lists typical applications of Naylor lightweight pipe in construction and other fields. Presents standard specifications on pipe from 4" to 30" in diameter. Includes fittings and flanges. Lists connections to meet all pipeline requirements including one-piece Naylor Wedgelock couplings. *Naylor Pipe Company.*



#### 267—Refinery Fittings

Bulletin KR-1257, specifically prepared for engineers, gives general descriptions with illustrations of 48 proven types of refinery fittings and alloy steel welding fittings. Also included is a section with information designed to aid in simplifying inquiries and in specifying fittings. *W-K-M, Division of ACF Industries, Inc.*



#### 268—Magnetic & Motorized Valves

Twenty-page catalog V-55 covers magnetic and motorized valves for air, water, gas, steam, oil, and refrigerants. It includes specifications, sizes, capacities, and suggested applications for each type of valve, flow charts for liquids and compressible fluids, tables of dimensions, and other engineering data. *The Mercoid Corp.*



#### 269—Steam Trap Manual

"The Armstrong Steam Trap Book, 2nd Edition," 46-page catalog J, explains the benefits of good trapping and how you can obtain them. A handbook section provides capacity charts and other data necessary to the correct trapping of all major classes of steam-heated equipment. Manual is completely indexed. *Armstrong Machine Works.*



#### 270—Tubing and Piping

This 12-page bulletin lists each type of Lewin-Mathes copper and brass tubing and piping with the temper, lengths, fittings, uses, and specifications. Sizes and capacities are in table form to aid in selection. Photos show use for water piping, air conditioning, heating, underground service and drainage lines. *Lewin-Mathes Co.*



#### 271—Stainless Steel Welding Fittings

Complete dimensional data for the full line of Tube-Turn stainless steel welding fittings and flanges are listed in this 56-page catalog. Technical section (14 pages) gives allowable working pressures, corrosion resistance, fitting tolerances, and allowable S values for stainless steel. Welding instructions also included. *Tube Turns.*



#### 272—Snow Melting Systems

Diagrams of actual layouts emphasize design and application in "Wrought Iron Pipe for Snow Melting Systems." Heat requirements, coil and grid patterns, use of anti-freezes, auxiliary equipment, paving, and fill are among design considerations discussed. Reports on airport and roadway systems also available. *A. M. Byers Co.*



#### 273—Impulse Steam Traps

Handy reference data on Yarway Impulse Steam Traps provided in 8-page bulletin T-1742 (57). Description, tables, and photo detail operation, capacities, and applications for normal, light, and extra heavy condensate requirements, and for various pressures and temperature ranges. Prices and dimensions. *Yarnall-Waring Co.*

## BOOSEY



### 274—Roof Drainage

A new presentation of section No. B-49-C-11 catalog, gives the consulting engineer everything at finger tip for any problem encountered in drainage of all roof surfaces for his building. This catalog replaces all roof drains in former plastic bound No. 34-1949 edition. Easy to find and specify the right drain. *The Norman Boosey Mfg. Co.*



### 275—Drinking Facilities

28-page detailed catalog describes and illustrates Haws varied lines of drinking facilities. Information on drinking fountains, wall and pedestal, single and multiple, in various materials; electric water coolers, commercial and restaurant; deck-type fountains; emergency eye-wash, and drench shower facilities. *Haws Drinking Faucet Co.*



### 276—Gate Valves

New 4-page circular V-126 explains how Fairbanks renewable seat ring gate valves are replaced without removing valve body from the line. Additional feature is silicon bronze alloy stem of great strength, highly resistant to corrosion, erosion, and abrasion, equipped with machined threads. *The Fairbanks Co.*



### 277—Stainless Steel Fittings

This 22-page catalog explains how Speedline stainless steel fittings reduce piping costs by allowing the designer to take advantage of the new and more economical Schedules 5 and 10 stainless steel pipe. A schematic drawing illustrates industrial applications. *Speedline Stainless Steel Fittings Div., Horace T. Potts Co.*



### 278—Valve Manual

Forty-page catalog B-2 is designed to help engineers select valve types, understand their characteristics, and determine space requirements. It includes such useful data as: pressure drop and flow tables, conversion tables, theory and application, recommended materials, and describes Pratt valves and operators. *Henry Pratt Co.*



### 279—Steam Heating Specialties

Illinois steam heating specialties — packless radiator valves, thermostatic and float traps, vapor systems, and boiler room specialties — are described in eight-page bulletin 201. Cross sections, elevation drawings, specifications, and a description of component parts are included for each item in the line. *Illinois Engineering Co.*



### 280—Fire Protection

"Allenco Fire Protection," catalog 150, 42 pages, contains specifications and detail drawings for consulting engineers on the complete installation of fire protection units of valves, racks, hose, nozzles, cabinets, either built-in or wall mounted, and standpipe and wall hydrant connections and nozzles. *The W. D. Allen Mfg. Co.*



### 281—Glass Lined Pipe

Folder deals with the glass lined sewer pipe with a mechanical joint. Amvit Glas-Glaz pipe is available in 4-ft. lengths. It is root and infiltration proof and is glass lined inside and out. The pipe has been designed for an under-the-house drain and also as a house-to-street sewer. *American Vitrified Products Co.*



### 282—Diaphragm Valves

Bulletin 800 details design and construction characteristics, sizing, capacities, and selecting instructions on unique type of valve for corrosive, abrasive, pressure, and vacuum service. Valve design provides disc for positive closure and diaphragm and sealing against leakage. Valve body of metal, rubber or plastic lining. *W. S. Rockwell Co.*



### 283—Hydraulic Tubing

Bulletin 39 describes SAE hydraulic quality low carbon steel tubing. Tables and charts include a comparison of five specifications for hydraulic quality tubing, tube sizes according to velocity versus flow, and recommended maximum working pressures and theoretical bursting pressures for various sizes and wall thicknesses. *Superior Tube Co.*



### 284—Safety Cleanout Valves

Bulletin 4004 describes the Petrometer safety cleanout valve for safe removal of water and sludge from storage tanks containing volatile liquids, eliminating danger of fire or explosion. Construction features and operation are discussed fully. The valve can be connected to the tank through liquid level indicator lines. *Petrometer Corp.*



### 285—Insulated Piping Systems

"Prefabricated Insulated Piping Systems," new 20-page bulletin 57-1, shows typical uses for Hel-cor pipe units for underground or overhead piping systems, and for Utilidor conduits for protection of underground utility services. Sample specifications are given, along with conduit sizing charts and trenching dimensions. *Ric-wil, Inc.*



### 286—Valve Catalog Digest

This new valve catalog digest furnishes the latest coverage of the OIC bronze, iron, cast steel, forged steel, and lubricated plug valve lines in a condensed form. Classified by type and pressure class, and illustrated, this edition also includes face to face dimensions for each size and type of valve listed. *The Ohio Injector Co.*



### 287—General Service Valves

Dimensions and detail drawings, plus a parts list are included in 20-page bulletin E-165. Bulletin discusses class 125 single and double disc, class 250, cylinder-operated valves, lubricated valves, valves for emergency protection, steam-jacketed valves, and valves for boiler blow-off. Fully illustrated. *Everlasting Valve Co.*



#### 288—PVC Pipe and Fittings

Bulletin PF 1200, eight pages, presents a list of applications for PVC pipe and fittings where corrosion resistance, non-toxicity, and noncontamination are required. Mechanical, electrical, thermal, and miscellaneous properties of both normal impact and high impact PVC products are in table form for easy reference. *The Luzerne Rubber Co.*



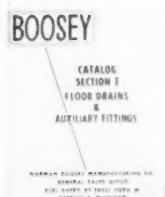
#### 289—Pipe Vibration

The plague of oscillation set up in pipe lines during pumping of compressible gases is costing industry millions of dollars yearly through inefficiency and pipe systems maintenance, according to booklet, "Bouncing Pipes," which deals in detail with the cause, effect, and remedy of this engineering problem. *Burgess-Manning Co.*



#### 290—Stainless Steel Tubing

Catalog 21 describes small diameter stainless steel tubing produced from 30 different alloys. Complete ordering information is given for Superior's standard size range (from .010- to  $\frac{5}{8}$ -in. OD in all analyses and thin-wall from  $\frac{5}{8}$ - to  $2\frac{1}{2}$ -in. OD in certain analyses). Includes large body of data useful in selection. *Superior Tube Co.*



#### 291—Floor Drainage

A new catalog section B-49-C-1, gives the consulting engineer everything at finger tip for any problem encountered in drainage of all floor surfaces within his building. This new catalog section makes it easy to find and specify the right Boosey drain needed for the job. Illustrations and specifications included. *The Norman Boosey Mfg. Co.*



#### 292—Metal Valves

Catalog F-24 describes most of OPW's nonferrous metal valves for handling hazardous liquids, food processing and corrosion-resistant applications. Gate valves, foot valves, swing check valves, cross valves, cross check valves, angle check valves, vertical check valves, and others of metals are illustrated. *OPW Corp., Jordan Industrial Sales Div.*



#### 293—Industrial Eye-Wash Units

New revision of four-page folder EW-3, covers emergency eye-wash fountains for industrial safety, including all recent developments. Controlled streams flush away dangerous matter instantly. Also deals with showers for decontaminating bodies and clothes. Gives detailed specifications and drawings. *Haws Drinking Faucet Co.*



#### 294—Welding Fittings

Bulletin TT867 provides dimensional and technical data for the complete line of Tube-Turn light weight welding fittings. Also discusses the economies of light weight piping in gas distribution, plant process piping, air conditioning, shipbuilding, etc. through lower material costs, less labor, and increased efficiency. *Tube Turns.*



#### 295—Welded Stainless Piping

"The Plastic Ductility of Austenitic Pipings Containing Welded Joints at 1200 F" is a report of an investigation into the problem of selection of materials for main steam piping. It gives data on the stress rupture characteristics of Types 316 and 347 stainless steel piping adjacent to welded joints. *Pittsburgh Piping and Equipment Co.*



#### 296—Jointed Clay Pipe

Jointed vitrified clay pipe known as Amvit, with a built-in mechanical joint made from polyvinyl chloride is described in four-page folder. Advantages such as infiltration prevention, quick installation, immediate backfilling, better flow, shock absorption, and quick testing in the field are pointed out. *American Vitrified Products Co.*



#### 297—PVC Pipe

Corrosion ratings in 400 chemicals are listed in types I and II PVC, and for eight ferrous, alloy and nonferrous metals. Characteristics, applications, properties, and installation practices are described in 30 pages. Engineering data includes working pressures at elevated temperatures, head loss, and friction factors. *A. M. Byers Co.*



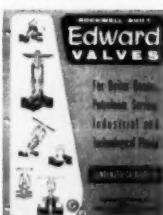
#### 298—Unions

Dart Unions are the subject of 4-page circular No. D-1. Made wholly of first quality, high-test, air refined malleable iron. Seats are precision ground to spherically true ball and socket joint and so matched that there are no cored parts to hold liquid or sediment regardless of the position when installed. *The Fairbanks Co.*



#### 299—Steam Traps

Valuable 12-page bulletin T-9 (57) shows trapping arrangement for 23 typical kinds of chemical processing equipment on fold-out piping diagram. Six pages of selector charts show proper size and type of Yarway Impulse Steam Traps to use with various processing equipment under specific conditions. Indispensable aid. *Yarnall-Waring Co.*



#### 300—Cast & Forged Valves

Condensed catalog 105, 28 pages, includes dimensions and illustrations describing nonreturn (stop-check) valves, globe and angle stop valves, pressure seal design, angle univalves, and small size globe valves designed for chain or extension operation in vertical lines. *Edward Valves, Inc., Subsidiary of Rockwell Mfg. Co.*



#### 301—Snow Melting Systems

"Steel Pipe Snow Melting and Ice Removal Systems," 32 pages, presents the case for snow melting systems and shows typical installations in commercial and industrial locations. Design data is complete with information on anti-freeze mixtures, sizes, and spacing. *Committee on Steel Pipe Research, American Iron and Steel Institute.*

## PLANT SITE SELECTION

### **302—100 Percent Financing**

"100% Financing for Your New Plant," a booklet describing the special Pennsylvania plan for 100 percent financing of new industrial plants in the State, tells how total financing can be achieved without cash investment by the manufacturer and gives other advantages of locating in the State. *Commonwealth of Pennsylvania, Dept. of Commerce.*



### **303—Colorado Site Facts**

Documented facts about sites, power, labor, raw materials, markets, transportation, climate, taxes, and living conditions are contained in the booklet, "An Analysis of Industrial Colorado and Its Potential for Industrial Development." Booklet is in loose-leaf form so that it can be kept up to date easily. *Colorado Dept. of Development.*



### **304—Plant Site — Marley Neck**

"Where Can You Pick a Plant Site Plum Like This?" is a broadside describing the largest deepwater plant site on the Atlantic seaboard, Marley Neck, Port of Baltimore. The booklet includes colored maps and a comprehensive air view of some 4200 acres on Chesapeake Bay near the heart of the city. *Baltimore and Ohio Railroad.*



### **305—Plant Location Services**

"Plant Location Services," an eight-page booklet for consulting engineers, manufacturers, distributors, engineering firms, industrial realtors, and management consultants, describes the industrial plant location services offered by the Pennsylvania Department of Commerce. *Commonwealth of Pennsylvania, Dept. of Commerce.*



### **306—Plant Sites**

"Look Where a Site is Production-Right," 24-page brochure, presents data useful to consultants and executives responsible for new plant location. Illustrated with colored maps, it describes power, fuel, labor, water, weather, key materials, transportation, and plant sites that offer best plant site possibilities. *Baltimore and Ohio Railroad.*



To order personal copies of these bulletins, please fill out the card between pages 4 and 5 or 36 and 37.

## POWER EQUIPMENT AND FUELS

### **307—Pressure Boiler**

Bulletin AD166 describes the new pressure boiler designed to provide low cost steam for dairies, laundries, dry cleaners, and industrial processing applications. Dry steam, high operating efficiency, and clean fire are results of meeting design standards found only in finest industrial boilers. Ratings 15-60 hp, 150 psi. *Cleaver-Brooks Co.*



### **308—Mobile Generating Stations**

Trailer mounted mobile generating plants, complete rolling power stations, are described in this plastic-bound handbook. For temporary tie-in, or semi-permanent installation diesel or dual fuel operation may be practical in four sizes 350-, 500-, 1000-, and 1250-kw. *White Diesel Engine Div., The White Motor Co.*



### **309—Hot Water Boilers**

"Package Boiler Economy for Modern Hot Water Systems," describes Cyclotherm's Cyclonic Combustion, a patented principle, now incorporated in a design to efficiently produce hot water. No other type boiler can match the package unit for economy of space and fuel consumption. *Cyclotherm, A Div. of National-U.S. Radiator Corp.*



### **310—Automatic Boilers**

Bulletin GB-1 shows installations of automatic packaged boilers, plus actual testimonial letters. All stress these units' compactness, efficiency, long life, low installation and maintenance costs. Units are available in standard sizes 15 through 200 psi for oil, gas, or combination of oil or gas firing equipment. *Ames Iron Works, Inc.*



### **311—Filtering Systems**

Bulletin number 14 deals with oiling and filtering systems, gravity or pressure, for all types of engines, pumps, compressors and machinery using oil as a lubricant or oil for fuel. Capacities, 1 to 1260 gpm depending upon the viscosity entering the filter and differential pressure drop, can be handled. *Wm. W. Nugent & Co., Inc.*



### **Continental BOILER COMPANY**



### **312—Packaged Boilers**

Bulletin BA-256, four pages, presents in table form complete design specifications for Continental automatic boilers with 100 to 500 hp ratings with modulating control. The bulletin illustrates and describes advantages and features of the design. Boilers fire Nos. 2, 5, and 6 oil or gas. Specifications are given. *Boiler Engineering & Supply Co., Inc.*



### 313—Guide Specifications

This 64-page brochure, including 5 drawings, is a comprehensive guide for preparing specifications on coal-fired low-pressure heating plants in the size range of 750,000 to 5,500,000 Btu per hr. All aspects affected by the choice of fuels from storage bin to stack design are covered fully in the bulletin. *Bituminous Coal Institute.*



### 314—Electric Plants

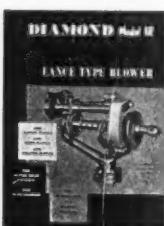
Catalog KEP56-1, 24 pages, shows the line of Kohler electric plants used as an independent source of electricity for sole supply and for automatic standby when central station power fails. Sizes range from 500 w to 50 kw, gasoline and diesel. Battery charging units in 6, 12, 36, and 140 v capacity are described. *Kohler Co.*



### 315—Oil Filters

Bulletin F-153 provides detailed data on Hilco Hyflow Oil Filters for filtration of lubricating and fuel oils for internal combustion engines, oil bath air filters and filtration of various types of industrial oils, fuel oil, solvents, coolants, etc., used in the manufacturing and chemical process industries. *The Hilliard Corp.*

To order personal copies of these bulletins, please fill out the card between pages 4 and 5 or 36 and 37.



### 316—Retracting Soot Blower

Bulletin 1079A describes improved Model IR short retracting soot blower for cleaning water cooled boiler furnace walls, hopper slopes, or narrow portions of tube banks adjacent to walls. Removes all dust and most slag deposits. Air motor, electric motor, or manual operation. Operates in very hot zones. *Diamond Power Specialty Corp.*



### 317—VP Boilers

Catalog P391, 16 pages, describes the new Type VP package boiler. Following a section of background information is an outline of principal design features. These boilers are shop assembled and provide steam capacities from 4000 to 42,000 lb per hr. Space requirements and specifications are in table form. *Combustion Engineering.*



### 318—Dual Fuel Burners

Bulletin B9 describes the Duonetic\* packaged burner for boiler firing with oil or gas. Webster Duonetic provides instantaneous interchange of gas and oil fuels. Eight sizes available with input range up to two and one-half million Btu. Bulletin gives complete specifications and typical installations. *The Webster Engineering Co.*



### 319—Emergency Power

New folder describes entire line of Onan Emergency Electric Plants, Controls and Accessories. Typical applications in hospitals, schools, stores, industries shown. Simple description of the function of Onan's Automatic Line Transfer Control is presented. Onan field men listed. Installation requirements. *D. W. Onan & Sons, Inc.*



### 320—Four-Pass Boilers

How Superior's four-pass boiler design lowers steam costs is explained in 20-page booklet. Rotary burner, gas burner, controls, and built-in induced draft feature are each described. Cutaway drawing shows path of combustion gases through the four passes. Data and dimensions are presented in table form. *Superior Combustion Industries, Inc.*



### 321—Hydraulic Turbines

Details on the Leffel turbines that drive both power generation and pumping units at the United States Bureau of Reclamation Chandler Power and Pumping Plant in the State of Washington are given in 12-page bulletin 1098-E. Descriptive literature on other recent Leffel turbine installations will be enclosed. *The James Leffel & Co.*



### 322—Safety Devices

Water columns, gages, valves, and other boiler safety devices are described in catalog 500, "Boiler Water Columns and Gage Equipment," available to consulting engineers. Many new designs are described completely with photographs, cross sections, and mechanical drawings. Specification and dimensions given. *The Reliance Gauge Column Co.*



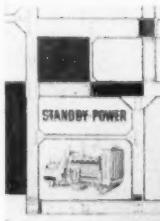
### 323—Packaged Boilers

Bulletin WT-10 describes and illustrates packaged boilers, with capacities from 8500 to 50,000 lbs per hour at standard design pressures up to 250 psi. Drawings and specifications, design and construction features are given in detail. Bulletin also shows how these boilers fit into your clients' planning for future needs. *Bros Inc.*



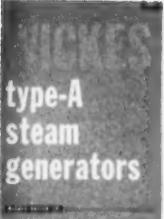
### 324—Diesel Engines

Complete 80-page catalog includes power curves, sectional drawings, and subassembly photographs of six basic engines in 19 models, a power range of 100 to 2150 bhp. Diesel, gas, and dual fuel engines and generator sets are available as a custom installation. Use of low cost fuels is discussed. *White Diesel Engine Div., The White Motor Co.*



### 325—Standby Power

Booklet 32876 describes the advantages of diesel-electric generating sets available from Caterpillar dealers. Space, fuel, and operating costs are discussed. Cutaways show typical Cat Electric Set. Brief specifications are given for 17 different engine models and a list of accessory equipment is also included. *Caterpillar Tractor Co.*



### 326—Water Tube Boilers

Wickes Type A steam generators, compact, efficient, shop assembled water tube boilers, are illustrated and described in catalog 56-1. It gives typical superheater arrangements for the boilers with section, plan, and side views of drainable "S," pendant, and drainable superheaters. Specifications are given. *The Wickes Boiler Co.*



### 327—Inert Gas Generators

Operating principles of the Thermal Sub-X inert gas generator are detailed in four-page bulletin 114. A schematic piping diagram is given for both gas and oil operation, along with sizes for typical capacities, suggested application for special installations, a list of typical uses, dimensions, and specifications. *Thermal Research & Engineering Corp.*



### 328—Automatic Boilers

These two bulletins cover Series E and F Continental automatic boilers with ratings of 20 to 80 hp, with on-off control and modulating control. Units use No. 2, 5, and 6 oil or gas or can be furnished to burn either. Bulletins give specifications, dimensions, capacities, types, and illustrations of various sizes. *Boiler Engineering & Supply Co., Inc.*



### 329—Self-Contained Boilers

Bulletin AD 162 describes basic design features of Cleaver-Brooks model CB self-contained boilers: four pass, forced draft design with 5-sq ft heating surface per boiler horsepower. Rated 15-200 hp: oil, gas, or combination fired with quick fuel interchange. For heating or processing, steam or hot water. *Cleaver-Brooks Co.*



### 330—Oil and Oil-Gas Burners

A variety of oil and combination gas-oil burners are included in illustrated 24-page bulletin 5629. It describes rotary oil burners, firing units with integral air registers, complete package units with factory control panels. The Oil Volumeter that provides steady, uniform oil flow with any grade of oil is shown. *Iron Fireman Manufacturing Co.*



### 331—Induced Draft Bifurcators

This 20-page catalog, DB-44-56, tells about the DeBothezat induced draft bifurcator for providing constant boiler draft. It simplifies analysis of induced fan requirements and gives all manufacturers' boiler code ratings reduced to relationship of Btu per hr delivered to the steam. *DeBothezat Fans, A Div. of American Machine and Metals, Inc.*



### 332—Steam Generator

Specification sheet describes 750 hp standard design steam generator for light and heavy oil and/or gas. A minimum of 80 percent efficiency is guaranteed in two passes. Equipped with any of five burner arrangements. Optional equipment, inspection, elevation, and painting are included. *Cyclotherm, A Div. of National-U.S. Radiator Corp.*



### 333—Boiler Service Valves

21-page bulletin E125, Everlasting Boiler Service Valves, contains quick and slow opening straightway valves—Model W, angle valves, "Y" valves, duplex blow-off units, water column valves—Model W, and fire protection valves—opening and closing types. Includes a full page of material specifications. *Everlasting Valve Co.*



### 334—Integral-Furnace Boilers

Bulletin G-76E describes the B&W Integral-Furnace boiler—Type FM. Complete size, dimension, and weight specifications along with interesting operational data are included. This completely shop-assembled, compact, reliable unit has a capacity range to 50,000 lbs steam per hr, pressures to 250 psi. *The Babcock & Wilcox Co.*



### 335—Condenser Expansion Joints

Discussion of expansion problems of turbine exhausts with special reference to modern, large or twin condensers is presented in this four-page bulletin. It shows construction of the Henry Pratt Rubber Belt Expansion Joint, and details advantages, such as simplified engineering of piping and temperature tolerance. *Henry Pratt Co.*



### 336—Surface Condensers

Twin Bank Balanced Flow design surface condensers—complete description, design details, exclusive features, and numerous photos of public utility and industrial power plant installations—are presented in 32-page bulletin 8.2K1. Details of Single Bank Balanced Flow design are in bulletin 8.1K1. *Ross Heat Exchanger Div. of American-Standard.*



### 337—Spread Stokers

This automatic coal firing unit for installations of 175 hp to 500,000 lbs steam per hr and upward is engineered for top efficiency with both low and high ash coals. Conveyor feeder won't clog and provides even distribution and continuous feeding through entire range of 50 to 7500 lbs of coal per hr. *American Engineering Co.*



### 338—6 Cylinder Engines

Bulletin SA-590-C gives specifications and performance data on K-67 and K-75 6 cylinder Oil Field engines... capable of operation up to 265 and 302 maximum hp respectively. Engines operate efficiently on either natural gas or butane and are used to power drawworks, mud pumps and generators on drilling rigs. *Climax Engine Mfg. Co.*



### 339—Petro Burners

Oil, gas and combination gas-oil firing units are described in catalog 3356A. For high or low pressure boilers. Capacities range from 3 through 200 gph for light or heavy oils and up to 24,750,000 Btu/hr gas input. Catalog also includes suggestions for selecting proper burners. Application data and dimensions. *Petro.*



### 313—Guide Specifications

This 64-page brochure, including 5 drawings, is a comprehensive guide for preparing specifications on coal-fired low-pressure heating plants in the size range of 750,000 to 5,500,000 Btu per hr. All aspects affected by the choice of fuels from storage bin to stack design are covered fully in the bulletin. *Bituminous Coal Institute.*



### 314—Electric Plants

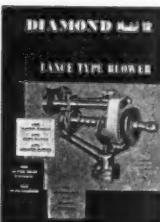
Catalog KEP56-1, 24 pages, shows the line of Kohler electric plants used as an independent source of electricity for sole supply and for automatic standby when central station power fails. Sizes range from 500 w to 50 kw, gasoline and diesel. Battery charging units in 6, 12, 36, and 140 v capacity are described. *Kohler Co.*



### 315—Oil Filters

Bulletin F-153 provides detailed data on Hilco Hyflow Oil Filters for filtration of lubricating and fuel oils for internal combustion engines, oil bath air filters and filtration of various types of industrial oils, fuel oil, solvents, coolants, etc., used in the manufacturing and chemical process industries. *The Hilliard Corp.*

To order personal copies of these bulletins, please fill out the card between pages 4 and 5 or 36 and 37.



### 316—Retracting Soot Blower

Bulletin 1079A describes improved Model IR short retracting soot blower for cleaning water cooled boiler furnace walls, hopper slopes, or narrow portions of tube banks adjacent to walls. Removes all dust and most slag deposits. Air motor, electric motor, or manual operation. Operates in very hot zones. *Diamond Power Specialty Corp.*



### 317—VP Boilers

Catalog P391, 16 pages, describes the new Type VP package boiler. Following a section of background information is an outline of principal design features. These boilers are shop assembled and provide steam capacities from 4000 to 42,000 lb per hr. Space requirements and specifications are in table form. *Combustion Engineering.*



### 318—Dual Fuel Burners

Bulletin B9 describes the Duonetic\* packaged burner for boiler firing with oil or gas. Webster Duonetic provides instantaneous interchange of gas and oil fuels. Eight sizes available with input range up to two and one-half million Btu. Bulletin gives complete specifications and typical installations. *The Webster Engineering Co.*



### 319—Emergency Power

New folder describes entire line of Onan Emergency Electric Plants, Controls and Accessories. Typical applications in hospitals, schools, stores, industries shown. Simple description of the function of Onan's Automatic Line Transfer Control is presented. Onan field men listed. Installation requirements. *D. W. Onan & Sons, Inc.*



### 320—Four-Pass Boilers

How Superior's four-pass boiler design lowers steam costs is explained in 20-page booklet. Rotary burner, gas burner, controls, and built-in induced draft feature are each described. Cutaway drawing shows path of combustion gases through the four passes. Data and dimensions are presented in table form. *Superior Combustion Industries, Inc.*



### 321—Hydraulic Turbines

Details on the Leffel turbines that drive both power generation and pumping units at the United States Bureau of Reclamation Chandler Power and Pumping Plant in the State of Washington are given in 12-page bulletin 1098-E. Descriptive literature on other recent Leffel turbine installations will be enclosed. *The James Leffel & Co.*



### 322—Safety Devices

Water columns, gages, valves, and other boiler safety devices are described in catalog 500, "Boiler Water Columns and Gage Equipment," available to consulting engineers. Many new designs are described completely with photographs, cross sections, and mechanical drawings. Specification and dimensions given. *The Reliance Gauge Column Co.*



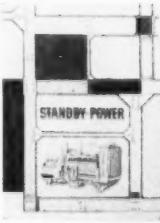
### 323—Packaged Boilers

Bulletin WT-10 describes and illustrates packaged boilers, with capacities from 8500 to 50,000 lbs per hour at standard design pressures up to 250 psi. Drawings and specifications, design and construction features are given in detail. Bulletin also shows how these boilers fit into your clients' planning for future needs. *Bros Inc.*



### 324—Diesel Engines

Complete 80-page catalog includes power curves, sectional drawings, and subassembly photographs of six basic engines in 19 models, a power range of 100 to 2150 bhp. Diesel, gas, and dual fuel engines and generator sets are available as a custom installation. Use of low cost fuels is discussed. *White Diesel Engine Div., The White Motor Co.*



### 325—Standby Power

Booklet 32876 describes the advantages of diesel-electric generating sets available from Caterpillar dealers. Space, fuel, and operating costs are discussed. Cutaways show typical Cat Electric Set. Brief specifications are given for 17 different engine models and a list of accessory equipment is also included. *Caterpillar Tractor Co.*

## type-A steam generators

### 326—Water Tube Boilers

Wickes Type A steam generators, compact, efficient, shop assembled water tube boilers, are illustrated and described in catalog 56-1. It gives typical superheater arrangements for the boilers with section, plan, and side views of drainable "S," pendant, and drainable superheaters. Specifications are given. *The Wickes Boiler Co.*



### 327—Inert Gas Generators

Operating principles of the Thermal Sub-X inert gas generator are detailed in four-page bulletin 114. A schematic piping diagram is given for both gas and oil operation, along with sizes for typical capacities, suggested application for special installations, a list of typical uses, dimensions, and specifications. *Thermal Research & Engineering Corp.*



### 328—Automatic Boilers

These two bulletins cover Series E and F Continental automatic boilers with ratings of 20 to 80 hp, with on-off control and modulating control. Units use No. 2, 5, and 6 oil or gas or can be furnished to burn either. Bulletins give specifications, dimensions, capacities, types, and illustrations of various sizes. *Boiler Engineering & Supply Co., Inc.*



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### 340—Water Tube Steam Generator

Water tube Type D Superior steam generators with capacities up to 50,000 lb steam per hour are described in eight-page bulletin. With the literature comes a 12-page folder of specifications prepared to aid consulting engineers in selection, evaluation, and specification of water tube packaged units. *Superior Combustion Industries, Inc.*



### 341—Auxiliary Power

Pocket-sized, 2-color folder describes and illustrates portable and emergency generating plants for every utility need. Onan's exclusive "VACU-FLO" Cooling System for units installed in enclosed areas... is described. Larger capacity units for mobile or stationary emergency service are also pictured. *D. W. Onan & Sons, Inc.*



### 342—Vibrating Grate Stoker

A water cooled vibrating grate stoker (sizes from 25,000 to 150,000 lbs steam per hr) that does not require a dust collector even at low ratings is described in this bulletin. Burns low grade coals and is easily adapted for burning gas or oil in combination with coal, or for the burning of coal alone. *American Engineering Co.*

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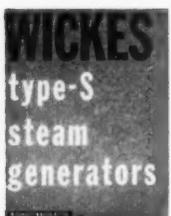
### 343—Oil Field Engines

Bulletin SA-574-B gives specifications and performance data on V-122 and V-125 12 cylinder Oil Field engines... capable of operation up to 520 and 605 maximum hp respectively. Engines operate efficiently on either natural gas or butane and are used to power drawworks, mud pumps and generators on drilling rigs. *Climax Engine Mfg. Co.*



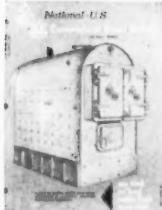
### 344—251 Diesels

Alco Products, Inc. has released new catalog DE-6, on Alco 251 Diesels. Brings you increased power and dependability for all applications—at less cost. Maintenance has been reduced and simplified. Catalog contains complete dimensions and specifications. These diesels are designed for low-cost, dependable operation. *Alco Products, Inc.*



### 345—Two-Drum Boilers

Wickes Type S steam generators, two-drum, water tube boilers built to a design pressure of 725 psi, are described in catalog 55-2. These units combine the water cooled furnace as an integral part of the boiler, adapting the high and low type furnace to the desired type of firing—coal, oil, or gas. Specifications given. *The Wickes Boiler Co.*



### 346—Commercial Steel Boilers

Catalog (Form No. 700A) deals with commercial steel boilers (SBI Table I Boilers) to meet the heating and hot water supply requirements of institutional, commercial, and industrial buildings. Sectional views highlight outstanding features. Sixteen sizes adaptable to gas, oil, stoker or hand firing. *National-U.S. Radiator Corp.*



### 347—Firetube Boiler

Bulletin MR-1 gives sizing details and describes equipment provided with the AMESTEAM Generator. Now being offered in a new design as the Model R, Ames Iron Works, Inc. has retained the advantages of its three pass concentric tube design, while incorporating operating advantages and easier maintenance. *Ames Iron Works, Inc.*



### 348—Jet Ignition Stokers

Bulletin G-85 describes the B&W Jet Ignition Stoker. Rapid response to load change ignition stability, efficient combustion, and a simple compact hydraulic drive insure economical operation. Jet Ignition Stokers adapted to boilers in specific industries are shown and a typical fuel chart with comments and ASTM rank. *The Babcock & Wilcox Co.*



### 349—Gas Burner

The thermal high velocity gas burner with positive flame stabilization and over 10,000,000 BTU/hr/cubic foot release is contained in 4-page catalog. Catalog gives a dimension table on series 200, 300, 400, and 600 burners plus a graph on output data. Catalog may prove welcome addition to files. *Thermal Research & Engineering Corp.*



### 350—Boilers and Stokers

Complete descriptive and specification information on rugged Scotch boilers for gas, oil, and coal firing, and automatic underfeed stokers for Scotch type boilers, is given in 28-page bulletin 236. This well illustrated brochure includes test results, performance data, and complete details of design and construction. *The James Leffel & Co.*



### 351—Industrial Oil Burner

Form 3382 describes industrial oil burner with integral air register. This burner simplifies combustion chamber construction and permits maximum combustion efficiency. For No. 6 or lighter fuel oils, from 11 through 120 gph, or available as combination gas-oil burner. Refractory combustion throat furnished. *Petro.*



### 352—Desuperheaters

Bulletin 150 explains the advantages of using low pressure, low temperature equipment in high pressure steam generating plants, and describes the evaporative type desuperheater now available as a packaged system. Operating characteristics are given for desuperheaters ranging from 8000 to 150,000 lb/hr steam input. *The Whitlock Mfg. Co.*

## PROCESS EQUIPMENT



### **353—Compressed Air Drying**

Four-page bulletin 223B covers the Lectrodryer equipment designed especially for handling compressed air, with particular reference to instrument air applications. It provides data on need for instrument air drying, moisture content of compressed air, and proper relative humidity. *Pittsburgh Lectrodryer Div., McGraw-Edison Co.*



### **354—Wood Tanks**

Eight-page bulletin 655-W explains why wood tanks can meet conditions other types of tanks cannot. It describes round, rectangular, and special tanks, vats, boxes, sinks, and flumes and lists possible uses for each along with the type of hardware and lining available, and gives installation photos. *Kalamazoo Tank and Silo Co.*



### **355—Corrosion Resistant Products**

General catalog 58 provides information on the complete line of corrosion resistant products manufactured by Duriron. The equipment includes pumps, valves, filters, pipe and fittings, anodes, fans, heat exchangers, steam jets, tower sections, ejectors, tank outlets, and mixing nozzles. Includes Durco alloy data. *The Duriron Co., Inc.*



### **356—Mixing Equipment**

Catalog 15 discusses types of blending equipment for chemical and process industries. Tables of dimensions and capacities are given for Twin-Shell production and "Liquid-Solids" blenders. Operating principles are outlined. Ribbon and double cone blenders are covered as are special heat exchangers. *The Patterson-Kelley Co., Inc.*



### **357—Process Equipment**

Bulletin 53 deals with various types of wood tanks and accessories for chemical processing, water storage, water treatment, and waste disposal. Bulletin 18 describes round tanks, frost proof pipe boxing, rectangular tanks, and tanks for sprinkler systems, etc. For economy and satisfactory performance use wood. *Wendnagel and Co., Inc.*



### **358—Industrial Ovens**

Twelve-page bulletin 200 describes Sly continuous-process and batch ovens for all baking, drying, finishing, or aging applications requiring up to 750 F. It tells how materials handling system for each installation is designed to meet particular job requirements. Advantages of forced convection heating systems are given. *The W. W. Sly Mfg. Co.*



### **359—Liquid Filters**

Bulletin number 7A deals with filtering liquids under pressure using a variety of filtering materials depending upon the type of liquid and fineness required. Made in single or duplex with switching valve. Capacities from 1 to 1260 gpm depending upon the allowable pressure drop and viscosity of the liquid. *Wm. W. Nugent & Co., Inc.*



### **360—Disc Roll Mill**

Bulletin 52, an 8-page catalog, describes the new Hardinge Disc Roll Mill, a roller-type mill based on the "Loesche Mill," for grinding relatively soft minerals, such as limestone, coal, phosphate rock, bauxite, talc, clays, celestite, gypsum, raw cement mix, sericite, and similar materials. Bulletin is well illustrated. *Hardinge Co., Inc.*



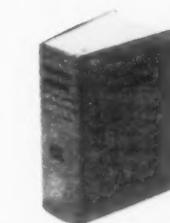
### **361—Platecoil Advantages**

Tranter's Platecoil bulletin lists and graphically illustrates the advantages, applications, and construction of the Platecoil units. More than a dozen varied applications are pictured and discussed. Specifications for the four Platecoil styles are listed, including their surface area, size and weight plus a conversion table. *Tranter Mfg. Inc.*



### **362—Purification Equipment**

Bulletin 96 describes the complete line of Hilco Oil Purification Equipment and tells how this equipment is being used by 38 different industries. Includes filters, reclaimers, purifiers, and refiners at work and demonstrates how they save money, oil and machinery. Assists in determining type of equipment. *The Hilliard Corp.*



### **363—Production Handbook**

Production Handbook is now in the second edition. This famed handbook condenses and integrates everything known about industrial production—organization, principles, systems, procedures, today's techniques for achieving maximum productivity at minimum costs. Edited by Gordon B. Carson. *The Ronald Press Co.*



### **364—Hard Rubber Equipment**

This four-page folder gives a general outline of hard rubber pipe and fittings, pumps, valves and containers. It contains dimensions of pipe fittings and valves, also diagrams and performance curves of hard rubber pumps. It lists the types of corrosive solutions that this equipment will handle safely. *The Luzerne Rubber Co.*



### 365—Mixers

"Simpson Mix-Mullers for the Ceramic Industry," four-page bulletin, outlines how this unit is used in the preparation of electronic porcelain, tile, structural clay and brick, refractories, whiteware, artware, dinnerware, and other ceramic bodies. Capacities, dimensions, and specifications on various models are listed. National Dust Collector Corp.



### 366—Vapor Collectors

Vapor, mist, and fog control bulletin 622-3 illustrates the complete line of Aget Miskop vapor collectors and gives specifications on each model. Applications throughout industry are described in detail and illustrated. Ways in which Miskops can improve production and cut down product rejects are shown. Aget Mfg. Co.



### 367—Silencers

Series ADS acoustic discharge silencers, designed to eliminate both high and low frequency noises caused by high velocity steam and air discharged to the atmosphere, are described in four-page bulletin 265. Specifications are given for optimum silencing, standard silencing, and for heavy industrial areas. Burgess-Manning Co.



### 368—Humidity Control

Bulletin 222 is a 32-page manual covering many examples of increased operating efficiency due to humidity control. Equipment illustrated includes air conditioning type Lectrodryers for maintaining lower humidities in rooms, air and gas dryers, breathers for storage tanks, and filters. Pittsburgh Lectrodryer Div., McGraw-Edison Co.



### 369—Tanks and Chests

Kalamazoo vitrified glazed tile tanks and chests are described in four-page bulletin 1 55-T. Drawings and photos show how the two types of tile blocks available provide flexibility of wall design. Types, sizes, design, erection, and cost are discussed, and typical installations in industry are pictured also. Kalamazoo Tank and Silo Co.



### 370—Mills

New 44-page catalog on mills for dry grinding and pulverizing, Bulletin 17-C. The catalog discusses the proper application and selection of conical mills, tricone mills, cascade mills, rod mills, tube mills, and disc roll mills for dry grinding problems. Describes various air classifying arrangements and shows plant flow sheets. Hardinge Co., Inc.

## PUMPS AND COMPRESSORS



### 371—Deep Well Submersible Pumps

Bulletin B-1000 describes Sumo's 6- and 8-in. deep well submersible water supply pumps, widely used for plants, schools, commercial buildings, and all types of services such as water supply, air conditioning, processing, and fire protection. Pump and motor are coupled together as a complete unit and operate under water. Sumo Pumps, Inc.



### 372—Double Suction Pumps

Performance data, dimensions, and specifications on the De Laval single-stage double-suction Types L, M, and P centrifugal pumps, with capacities of 1000 to 20,000 gpm and heads to 350 ft, are presented in six-page bulletin 1004. Features, construction, dimensions, and advantages are described. De Laval Steam Turbine Co.



### 373—Reciprocating Compressors

Bulletin 76-A provides description and specifications on latest Cooper-Bessemer type GMXD engine-driven reciprocating compressors. Gives construction details for operation as pre-piped, skidded or non-skidded unit; for manual or automatic control. Includes complete span diagrams. 265 to 825 hp range. Cooper-Bessemer.



### 374—Pumping Problems

"How to Solve Pumping Problems," 36-page instruction manual, covers important fundamentals of estimating requirements of the average pumping job. It contains sample problems on hydraulic systems, general transfer, and pressure transfer, plus tables, charts, and other pertinent engineering and design data. Roper Hydraulics, Inc.



### 375—SLHC Compressors

This 16-page bulletin describes the SLHC, Worthington Corporation's new 4-cycle turbocharged gas engine compressor in the medium horsepower range. Many illustrations including dimension drawings, rating charts and cutaways are used throughout in presenting the most important features. Worthington Corp.



### 376—Refrigeration

Bulletin TC-406, a new four-page folder describes Thermobank Compressors, factory assembled automatic re-evaporative hot gas defrost system for low temperature applications. Units are factory tested and ready to operate. Bulletin features tamper proof casing and air cooled condenser. Kramer Trenton Co.



### 377—Rotary Compressors

Described in 12-page bulletin 16B8126 are single-stage sliding vane rotary vacuum pumps rated 55 to 5600 cfm for 10 to 28 inches vacuum and compressors from 42 to 3250 cfm at 5 to 50 psig. Facts on operation, construction, specifications, and reasons why rotary units provide more economical operation. *Allis-Chalmers*.



### 378—CB Screw Pumps

Technical Bulletin 252 describes Type CB high pressure screw pumps for various oil services requiring up to 1000 psi pressure. The viscosity range of the pump is 35 to 75,000 ssu. Selection nomographs, outline dimensions, sectional view, and details of construction and design are provided in bulletin. *Warren Pumps, Inc.*



### 379—Air Compressors

The Brunner catalog 36 describing air compressors, 1/4 through 20 hp, is designed as a textbook, a complete guide to air compressors. It includes full engineering information on the use of compressed air, detailed data useful in choosing the right compressor, and computation tables to aid installation. *Brunner Div., Dunham-Bush, Inc.*



### 380—Pump Catalog

Contains 20 sections; liquid pump performance and specification data, sectional views, and dimension drawings. Types include: Centrifugal—single and multistage with single or double suction; turbine; nonclog sewage and sump; steam piston, wet vacuum, condensation, hydraulic plunger, piston, etc. *American-Marsh Pumps, Inc.*



### 381—Self Priming Pumps

Bulletin 725.6 describes new type liquid ring pump with remarkably fast self-priming ability. Handles liquids, air, or any combination of both. Capacities to 65 gpm. Furnished in all iron or 316 stainless steel as pump-motor unit, portable unit on casters or pump only arranged for a belt drive. *Goulds Pumps, Inc.*



### 382—Circulating Pumps

Bulletin 1010 is an illustrated 46-page technical description of the new standard line of Byron Jackson Circmaster Vertical Circulating Pumps. Includes general description, sizes and range of service, applications, construction details, material specifications, price lists, sectional drawings, and performance charts. *Byron Jackson Pumps, Inc.*



### 383—Centrifugal Pumps

Bulletin 300, six pages, describes general service Unipumps. Versatility in mounting is pictured and discussed. Folder includes giant pump selection table from 10 to 1700 gpm, heads from 15 to 260 feet for fast reference. Cutaway illustrations show construction. Principal pump and motor dimensions are given. *The Weinman Pump Mfg. Co.*



### 384—Industrial Pumps

Easy to use table for determining horsepower, capacity, and head for close-coupled vertical pumps makes bulletin 1100 worth keeping. It also contains sectional views, material specifications, schematic application drawings, and photos of installations. Veri-Line pump features are clearly illustrated and described. *Layne & Bowler Pump Co.*



### 385—Compressors & Vacuum Pumps

Bulletin C-6 describes Fuller rotary compressors and vacuum pumps, gives cutaway drawings, and illustrates uses by pictures of typical in-plant installations. For compressing air and gases, units have capacities to 3300 cfm; pressures to 125 psig; vacuums to 22.95 in. (with reference to 30 in. barometer). *Fuller Co.*



### 386—Submersible Turbine Pumps

Bulletin 6910 describes the Fairbanks-Morse new large line of water lubricated submersible turbine pumps designed especially for use by industry and municipalities. It is printed in several colors and shows cross sections as well as features of pumps. It also contains submersible motor ratings and capacities. *Fairbanks, Morse & Co.*



### 387—Rotary Pumps

Catalog C covers heavy-duty pumps ranging in size from 10 to 1050 rpm. Complete specifications for 165 different pump models are included. Pumps for pressures up to 100 psi on non-lubricating liquids, 200 psi on lubricating liquids all are self priming and capable of handling liquids from LP-gas to 2,500,000 SSU. *Viking Pump Co.*



### 388—Fire Pumps

Bulletin B-1500 describes a comprehensive line of approved horizontal centrifugal fire pumps for industrial and commercial service. Approved by Underwriters' Laboratories and Associated Factory Mutual Fire Insurance Companies. Rating and performance charts. *Peerless Pump Division, Food Machinery and Chemical Corp.*



### 389—Liquid End Pumps

Bulletin No. WS-86 explains how Wagner Duplex units pump asphalt, tar oils, and heavy liquids heretofore regarded as impossible to handle because of high viscosity and low pumping temperature. Because exhaust steam from pump is used for heating the liquid end, there is no additional operating expense. *Canton Stoker Corp.*



### 390—Proportioning Pumps

Catalog No. 604 describes the full line of precision proportioning pumps with capacities from cc's per hour to 730 gph per feed. Pressures up to 30,000 psi. Wide selection of materials of construction gives versatility in application. All pumps that are described can be adapted for automatic control. *Hills-McCanna Co.*



### 391—Engine Turbocharging

Bulletin 84, "GMXF Parallel Turbocharged V-Angle Compressors," gives engineering descriptions of newest parallel turbocharging of Cooper-Bessemer GMXF engine-driven reciprocating compressors. 330 to 825 hp. Specifications and dimensions given for installation as packaged or as unskidded units. *Cooper-Bessemer*.



### 392—Diaphragm Pump

Bulletin number 301 describes in detail the features of the new McCanameter Diaphragm pump. The versatility of this unit for precise ratio control in the proportioning of fluids is covered on Page four. Pump speeds up to 900 strokes per minute; capacities up to 6 gph. Illustrations and dimensions. *Hills-McCanna Co.*



### 393—Can Type Pumps

Bulletin B-1700 describes both transfer and process type encased close coupled vertical pumps, widely used for pumping hydrocarbons, hot or cold water, etc. Has excellent NPSH characteristics. Vertical design saves installation space. Capacity 3000 gpm; heads to 1000 feet. *Peerless Pump Div., Food Machinery and Chemical Corp.*



### 394—Double Suction Pumps

De Laval single stage double suction Types T, U, and W centrifugal pumps for handling large volumes of water are described in six-page folder 1005. Advantages of each construction feature are detailed and a cutaway drawing given. Double volute pumps for heads of 250 feet and higher are described briefly. *De Laval Steam Turbine Co.*



### 395—Multiple-Cell Pump Basin

Paper No. 57-A-59 is an illustrated eight-page study by W. L. Dornaus, senior engineer, covering the problems of multiple-cell pump basin design. Presents the background, problem, and solution using the Tidewater Refinery as the example. Describes use of scale model tests, observations, and conclusions. *Byron Jackson Pumps, Inc.*



### 396—Drainer Pumps

Bulletin B-1100, Sumo drainer pumps, a must for every construction project, power plant, factory, mine, ship, dock . . . wherever water has to be pumped rapidly, dependably, economically. Use them in permanent or portable service for draining, flooding, or general service plumbing. Specifications given with detail drawing. *Sumo Pumps, Inc.*



### 397—Twin Screw Pumps

Technical bulletin 255 features Twin Screw Pumps (type TS) for noncorrosive liquids of wide viscosity range at pressures up to 350 psig and capacities up to 550 gpm. Selection nomograph, outline dimensions, sectional drawing, and details of design and construction of the units are provided in bulletin. *Warren Pumps, Inc.*



### 398—Heavy Duty Screw Pumps

Bulletins S4 and SE5 describe line of screw pumps for heavy duty pumping of lubricating and nonlubricating fluids and semi-fluids, from 32 to 1,000,000 ssu; capacities 1 to 1000 gpm; discharge 1000 psi for viscous liquids, 500 psi for water. Internal or external bearing types, vertical or horizontal available. *Sier-Bath Gear & Pump Co., Inc.*



### 399—Submersible Booster Pumps

Verti-Line submersible booster pumps and motors (designed by Layne & Bowler and General Electric) are described in four-page folder 400. It gives specifications, selection tables, and application data. Sketches show pumps in typical installations for cooling tower service, sump operation, and fire protection. *Layne & Bowler Pump Co.*



### 400—Rotary Positive Gas Pumps

Bulletin 31-B-17 deals with rotary positive displacement gas pumps, 7-in. gear diameter and smaller, and accessory equipment. Selection tables, dimensions, performance data, and illustrations for 18 standard sizes are given for 0.5 sp gr gas, capacities 5 to 900 cfm at pressure 1 to 6 psig. *Roots-Connersville Blower.*



### 401—Nonclog Pumps

Bulletin 1410 deals with Vertical, Non-Clog Unipumps with close-coupled motor drive. Selection table, dimensions and specifications, plus sectional drawings and parts list are included. Detailed description and operating data of pumps also listed. Output ratings to 1800 gpm, up to 600-ft head; hp ratings to 25. *The Weinman Pump Mfg. Co.*



### 402—Centrifugal Pumps

Bulletin 350 will help to select Types HLM-HIM horizontal split-case, single-stage, double-suction pumps for chilled water, booster service, etc. Performance, specs, dimensions on 17 sizes. Large sectional view shows choice of bearings. Capacities range from 85 to 4500 gpm at heads up to 175 feet. *American-Marsh Pumps, Inc.*



### 403—Vertical Sump and Process Pumps

Bulletin 726.2 describes new complete line of heavy duty vertical centrifugal sump and process pumps. Capacities up to 1080 gpm are available at heads up to 290 feet and for pit depths to 20 feet. Single and duplex units for wet or dry pit operation are shown, plus many new features of the pump construction. *Goulds Pumps, Inc.*



### 404—Boiler Feed Pumps

New heavy duty turbine type boiler feed pumps (to 150 gpm), longer life with least maintenance, are described in Bulletin 65, 8 pages. Pumps have specially hardened impellers, oversize, heavy duty bearings, shafting and leak-proof, wet-or-dry shaft seals. Specifications and details are given in handy bulletin. *Fred H. Schaub Engineering Co.*

## SOUND SYSTEMS

### 405—Hospital Systems



Twelve-page color booklet illustrates and describes a large variety of individual hospital communication and sound systems, including audio-visual nurse call, doctor's paging, bedside radio-sound, and administrative intercom. Equipment, operating features, local planning, and service facilities discussed in detail. *Executone*.

### 406—Industrial Sound Systems



Four-page bulletin 12k/Du illustrates and describes sound, alarm, and evacuation systems in use in some of the largest companies in the country. It outlines operation and functions of various types of systems designed to meet specific requirements, and emphasizes use of standard panels for custom systems. *DuKane Corp.*

### 407—Fire Alarm Systems



"Interior Fire Alarm Systems," 20-page bulletin 3A, explains operation, supervision, uses, and features of both coded and noncoded systems. Non-coded systems are designed principally for applications where the entire building is to be evacuated; coded systems where it may not be necessary to notify entire building. *Wheelock Signals, Inc.*

### 408—Schoolroom Acoustics



This new 16-page booklet entitled "Classrooms for Easy Listening" describes the importance of sound reflective ceilings in school design. It also covers such subjects as voice reinforcement, reverberation time, and transmission of sound between rooms—all valuable information for consultants. *The Flexicore Co., Inc.*



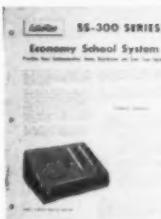
### 409—Call Systems

"Code Call Systems," six-page folder 4B, outlines advantages of these types of systems, which can be tied in with existing public address systems if desired. The installations are available for 20- or 40-call capacity. The 20-call system can be increased to 400 calls easily. Drawings are given of two types. *Wheelock Signals, Inc.*



### 410—Signaling System

Standard Electric Time's 8-page catalog No. 221 describes their Royalmatic Nurse Saver hospital signaling systems. Included are photos and descriptions of the components with list numbers. A description of the over-all workings of the system is given, with suggestions as to how and where they might be utilized. *Standard Electric Time Co.*



### 411—Combination Systems for Schools

Eight-page catalog illustrates and describes a flexible, economical school system, combining sound, intercom, and time tone signals. This system can, at any time, be easily expanded to provide console or rack panel equipment, interior fire, and emergency alarms without sacrificing original wiring, conduit, or classroom stations. *Executone*.



### 412—School Sound Systems

Eight-page brochure 7135-D-55 illustrates and describes a complete line of Underwriters' listed school sound distribution systems. It covers equipment suitable for the smallest to the largest school units. Building-block flexibility of console styles, panels, and functions is pointed out. High power intercoms are covered. *DuKane Corp.*

## STRUCTURAL MATERIALS AND EQUIPMENT

### 413—Long Span M-decks



Installation data and detail drawings are given in 16-page catalog LSD-58 for use of long span M-decks. They have been especially designed to provide a better balanced, more efficient structural unit for roof and combined roof-ceiling construction. Includes acoustical treatment and troffer or recessed lighting. *The R. C. Mahon Co.*



### 414—Steel Round Bars

Lehigh University has made available "Investigation of the Column Strength of U.S.S. 'T-1' Steel Rounded Bars," for the United States Steel Corp. The tests were made to provide data for design formulas for use with the U.S.S. "T-1" constructional alloy steel round bars used as compression members. *United States Steel Corp.*



### 415—Grouting Guide

Methods for the nonshrink grouting of various types of machinery and equipment are illustrated and described in this grouting guide, EPMG-2A, 8 pages. Discussion covers shrinkage, compressive strengths, oil and water resistance, cold and hot weather grouting, and the advantages of using Pre-Mixed Grout. *The Master Builders Co.*

To order personal copies of these bulletins, please fill out the card between pages 4 and 5 or 36 and 37.

### 430—Aluminum Grating



### 437—"Tri-Ten" Alloy Steel



#### 416—Safety Grating

Safety Grip-Strut, an anti-skid grating in which the vertical members are joined by integral saddle to create lateral struts of great strength, is described in 12-page booklet. General applications, installation and assembly, and fastening devices are discussed. Load tables are given for both steel and aluminum grating. *The Globe Co.*



#### 417—Corocrete-A

Bulletin 120-A describes Corocrete "A"—an economical, corrosion-proof flooring material for protection against acids, alkalis, and solvents commonly found in chemical, food processing, plating, and metal working plants. Bulletin details resistance characteristics, physical properties, specifications, and instructions. *The Ceilcote Co., Inc.*



#### 418—Rolled Steel Floor Plate

New eight-page booklet 3312 on A. W. Algrip abrasive rolled steel floor plate contains an allowable uniform load table and table of maximum sizes for plates from  $\frac{1}{8}$  to  $\frac{1}{2}$  inch in thickness and complete engineering and fabricating data. Many safety applications for A. W. Algrip floor plate are pointed out. *Alan Wood Steel Co.*



#### 419—Floor & Deck Building Panels

BP-20 deals with light gage steel cellular structural panels. Long span panels are available up to 31-feet long for normal roof loadings. Variations such as integral acoustical and electrification systems also are shown. Descriptions, specifications, installations, engineering data, and construction details are included. *Fenestra Inc.*



#### 420—Concrete Fasteners Guide

Catalog 57 features the complete line of Red Head concrete fasteners. Contains specifications for snap-off end, rod hanger, tie-wire, stud-anchor, flush end, and clinch nail fasteners ( $\frac{1}{4}$ - to  $\frac{7}{8}$ -in. bolt size). Diagrams illustrate impact hammer and hand installation. Accessories and electric impact hammer also are shown. *Phillips Drill Co.*



#### 421—Interior Wall Finish

Swift's Adcote adhesive finish, a new concept in interior wall finish for board type insulation, refinishing concrete surfaces, resurfacing brick walls, dry wall construction, and applying ceramic tile is described in folder 9383. Principally for cooler and freezer walls, the finish retains its whiteness. *Swift & Co., Adhesive Products Dept.*



#### 422—Steel Joists

This 40-page steel joist catalog contains complete design information for spans up to 120 ft. It covers in detail design calculation, bridging, end details, and accessories. Complete tables of properties and dimensions, standard loading, and design load, and marking system for ordering are given. *American Bridge Div., United States Steel Corp.*



#### 423—Cylinder Piles

"Raymond Cylinder Piles of Prestressed Concrete," 20-page catalog describes and illustrates the manufacture, versatility and economic applications of prestressed concrete cylinder piles and related prestressed products. Numerous photographs of installations and drawings of suggested designs are shown in brochure. *Raymond Concrete Pile Co.*



#### 424—Colored Hot Mastic Floors

Bulletin deals with new type Ferrolite hot mastic floors in colors (red, brown, green, gray, and black), completely acid, oil, and grease proof. Complete information is presented on what Ferrolite is, how it is laid, special uses, where it can be used, and types of applications that are best suited to its use. *Fulton Asphalt Co.*



#### 425—Grating and Treads

Gary grating and treads tailor-made to suit your individual requirements are illustrated in a 24-page brochure. Two-page spread includes tables of safe loads, specifications, and other engineering data. Photographs also show many typical applications of the decking. *Gary Grating Div., Rockwell Spring and Axle Co.*



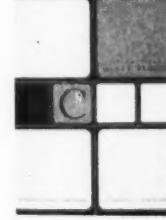
#### 426—Steel Stair Treads

Tread-Grip steel stair treads combine strength of construction with safe, non-slip footing, according to four-page booklet HTP2130. It describes such features as A. W. Algrip nosing, electroforged and welded construction, and twisted cross bars. Detail drawings and dimensions. *Speedline Stainless Steel Fittings Div., Horace T. Potts Co.*



#### 427—Plastic Panels

Brochure "What to look for in a good translucent building panel" gives complete coverage of all characteristics in a translucent structural panel. Also explains in detail exactly what to look for when purchasing or specifying these panels. 4-page colored brochure. Completely illustrated. *Corrulux Div. of L-O-F Glass Fibers Co.*



#### 428—Glass Blocks

Completely new 32-page catalog, incorporating recently introduced Color Glass Blocks and the new concept of "glass block curtain walls." A reference manual for architects, engineers, and contractors. Full data on light transmission, insulation values, accessory materials, and complete specifications. *Pittsburgh Corning Corp.*



#### 429—Additive Compounds

This 4-page brochure describes Sika-C additive used with portland cement mortar for setting tile, marble and cut stone. It is also used for repair work such as "spotting" marble and terrazzo. A chart showing expected setting time with various dilutions is included in the brochure. *Perfo Division, Sika Chemical Corp.*



#### 430—Aluminum Grating

This new four-page folder features unusual uses for floor grating, including its use as sun shades for modern schools, and as low maintenance pressure-locked fencing that never needs painting. It shows dimensional diagrams of standard designs and gives safe load table for aluminum grating. *Borden Metal Products Co.*



#### 431—Rolling Doors

New, 1958 bulletin 92 demonstrates how both wood and steel RoL-TOP doors, with their straight-line outward appearance, are well suited to modern building needs. Drawings show recommended types for various applications and clearances, types of operation, special features, and dimensions. *The Kinnear Mfg. Co.*



#### 432—Rapid-Assembly Shelving

Bulletin 2279 describes new Hallowell Erectomatic steel shelving with built-in fast-locking device that speeds assembly and rearrangement. Closeup photos detail locking action, other construction features, and show the various types of shelving offered in regular, medium, heavy, or extra-heavy construction. *Standard Pressed Steel Co.*



#### 433—Metal Roofing

The improved protected metal roofing and siding that is tested and classified by Underwriters' Laboratories and Factory Mutual Laboratories. Galbestos is now available in a variety of attractive colors. Can be applied on insulated or uninsulated buildings. Bulletin gives details for standard construction. *H. H. Robertson Co.*



#### 434—Architectural Products

New wide-flange shapes, 10- and 12-in. joists with 3-in. flanges, and an expanded section of loading tables are introduced in this new catalog. Also detailed are complete line of joists, studs, channels, ribbed decking, and metal curtain walls. Nailable feature permits attachment of collateral material easily. *Stran-Steel Corp.*



#### 435—Concrete Wall Panels

Insulated precast concrete wall panels and rigid steel framing combined in custom "Panel Bilt" buildings are shown in four-page pamphlet 7285. Panel and structural details are shown for each industrial and commercial purpose described. How this type of construction saves time and money is explained. *The Marietta Concrete Corp.*



#### 436—Welding Supplies

SB-1354 describes Lincoln automatic electrodes and fluxes for submerged arc welding and hardsurfacing. Describes automatic coiled electrodes for all types of submerged arc welding and fluxes for mild steel, low and medium alloy steels, and hardsurfacing applications. Aids proper selection of welding materials. *The Lincoln Electric Co.*



#### 457—Pre-Engineered Buildings

Catalog 1375 describes the character-



#### 437—"Tri-Ten" Alloy Steel

"Tri-Ten, High-Strength Alloy" is title of 24-page catalog by United States Steel. Catalog gives properties and characteristics including weldability, workability, corrosion resistance, mechanical property requirements, chemical composition, and comparative engineering data. Also includes fabricating data. *United States Steel Corp.*



#### 438—Asbestone Panels

Twelve-page booklet illustrates the many and varied uses of Gold Bond Asbestone panels, ideal for interior or exterior use. Made of high quality asbestos-cement sheets, laminated to asphalt-impregnated insulation board, they afford the advantages of quick, economical erection, plus built-in insulation. *National Gypsum Co.*

To order personal copies of these bulletins, please fill out the card between pages 4 and 5 or 36 and 37.



#### 439—Data File

AA Wire Products Co. is offering a data and specification file for use by engineers and builders. This file contains brochures, test results, technical reports, and list prices on their masonry reinforcement and masonry ties for all service requirements in both solid and cavity wall construction. *AA Wire Products Co.*



#### 440—Milcor Celluflor

Catalog No. 270, 1958 Edition, describes Milcor Celluflor, a structural subfloor that provides raceways for in-floor wiring—giving buildings complete electrical flexibility and adequate provisions for future electrical needs. Installation, electrification, and fireproofing data are given for seven panel types. *Inland Steel Products Co.*



#### 441—Community Buildings

Catalog 1567 illustrates, in full color, and describes many types of community buildings constructed under the Butler Building System for churches, schools, government, and public and private organizations. Details the features of materials, construction, and design, and highlights the advantages and economies. *Butler Mfg. Co.*



#### 442—Structural Bracing

Bulletin 229 describes and illustrates flexible ball-type end-fittings for use on guy rods, braces, and struts installed to limit wind sway, dampen vibration, protect against seismic shock damage, carry stress loads, or allow for thermal expansion. Applicable to tall columns, stacks, and vessels. *Barco Manufacturing Co.*



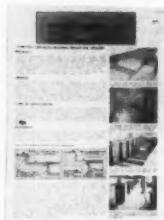
#### 464—Calculator

*AA Wire Products Co.* is offering a com-



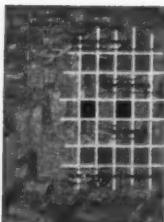
#### 443—Translucent Panels

Bulletin SW-2 gives complete selection data, physical and chemical properties, general recommendation and installation details as well as accessory data for Corrulux translucent structural panels. Gives specifications in table form. Installation details and typical detail drawings. *Corrulux Div. of L-O-F Glass Fibers Co.*



#### 444—Corrosion Proof Linings

Bulletin 533 features Ceilcote's complete line of corrosion-proof linings, bricks, bonding cements, protective coatings, and acid-proof floors for industry. Describes Ceilcote's complete engineering and installation services for solving individual corrosion problems. Illustrations and tables included. *The Ceilcote Co., Inc.*



#### 445—Grid System Panels

The curtain wall that offers complete design versatility with standard components. Robertson's grid system conforms to any module and offers an infinite variety of colorful metal panels, including porcelain enameled aluminum with trim. Single or double glazing, with any type of operating sash. *H. H. Robertson Co.*



#### 446—Curtain Walls

Catalog describes the Lupton curtain wall systems developed in cooperation with leading architects. Incorporating Lupton's 50 years of experience in the manufacture of metal windows, Lupton Curtain Walls have been tested and approved by actual use. Includes construction details, specifications, and dimensions. *Michael Flynn Mfg. Co.*



#### 447—Concrete Installation Services

Newly published eight page reference bulletin describes special Intrusion-Prepakt services pertaining to soil stabilization, foundations, mixed-in-place piles, cast-in-place piles, structural, and marine concrete. Pertinent data will be supplied for all other problems. Well illustrated plus specifications. *Intrusion-Prepakt, Inc.*



#### 448—Roof Anchoring

The new Perfo system of rock anchoring is described in a 4-page folder. This system provides a fully grouted roof bolt and is effective in areas of soft rock. High shear resistance, long life, and simple installation are among the advantages detailed. The illustrations include drawings and photos. *Perfo Division, Sika Chemical Corp.*



#### 449—T-1 Steel

United States Steel "T-1" . . . nearly 3 times the yield strength of structural carbon steel, weldable without preheating, exceptional toughness, even at sub-zero temperatures, outstanding resistance to the combination of impact abuse and abrasion . . . is fully described in 64-page catalog ADUCO-607-56. *United States Steel Corp.*



#### 450—Concreting

Case histories of concreting problems encountered in stadium and auditorium construction are reported in new 20-page book. Discussion covers lightweight concrete, thin shell structures, durability, hot and cold weather concreting and the need for a workable concrete mix under all these conditions. *The Master Builders Co.*



#### 451—Welding Equipment

Complete description of Lincolnweld equipment for shop or field submerged arc automatic welding applications. Includes data on both ac and dc welding heads, controls and power sources. Also has information on accessories, such as travel carriages, tractors, and Spreadarc and Twinarc attachments. *The Lincoln Electric Co.*



#### 452—Concrete Fasteners

"Reddi-Reference" chart pictures Red Head Concrete Fasteners in full size. All types: flush end, snap-off end, stud anchor, rod hanger, tie wire, and clinch nail. Also shows Red Head chucks and gives instructions for installing fasteners by hand or impact hammer. Chuck ordering information on back cover. *Phillips Drill Co.*



#### 453—Storage Walls

This eight-page bulletin introduces Hallowell storage wall—a versatile shelf and drawer system for stocking small parts, file cards, records, and similar items. Illustrations show how nests of steel drawers are stacked and bolted together to form self-supporting walls or partitions for office or shop use. *Standard Pressed Steel Co.*



#### 454—Grating

This 16-page catalog shows the three basic types of grating construction; gives more than 30 dimensional drawings of subtypes; eight safe load tables covering steel and aluminum grating, roadway grating, and sidewalk slabs; tables on panel widths, tread widths, and floor armor. Planning layouts are given. *Borden Metal Products Co.*



#### 455—Asphalt Mastic Floors

This folder deals with a complete list of industrial mastic floorings: asphalt mastic, acid proof mastic, heavy duty trucking and asphalt block floors, also the new Ferrolite hot mastic floors in colors. Shows advantages and adaptability of asphalt mastic floors, especially acid proof types, with thickness and weight loads. *Fulton Asphalt Co.*



#### 456—Insulated Wall Panels

Insulated panels consist of interior steel liner panels, insulation, and fluted exterior panels in a choice of galvanized or painted steel and leather grained aluminum are discussed in catalog No. 243. Exterior panels may be used alone as a non-insulated siding for unheated buildings. *Inland Steel Products Co.*



#### 457—Pre-Engineered Buildings

Catalog 1375 describes the characteristics and advantages found in pre-engineered, mass-produced metal buildings for both commerce and industry. Explains the Butler Building System, combining collateral materials for beauty and economy. Illustrates construction features, design details, and available accessories. *Butler Mfg. Co.*



#### 458—Foundations

12-page booklet entitled "Subsoil Investigations for Foundations," Catalog B-7, explains the reasons for making test borings to determine foundation requirements, what Gow test borings are, how they are made and the results obtained. Illustrated are methods for making borings and taking soil samples. *Raymond Concrete Pile Co.*



#### 459—Building Products

Aluminum Co. of America now offers "Alcoa Aluminum Industrial Building Products," a 36-page booklet describing in detail the characteristics, dimensions, availability, and specifications for Alcoa Aluminum Roofing and Siding designed specifically for application in industrial buildings. Booklet is fully illustrated. *Aluminum Co. of America.*



#### 460—Stran-Master Buildings

New 'erect-it-yourself' all-steel buildings, called the STRAN-MASTER, are described in illustrated catalog. Ideal for low-cost warehousing, light manufacturing, retail stores, general utility, the STRAN-MASTER can be erected by an unskilled crew in 180-200 man-hours. Adjustable telescoping columns and girts. *Stran-Steel Corp.*



#### 461—Sectional Wall Panels

BP-21 deals with light gage steel and aluminum insulated and uninsulated wall panels with galvanized steel, porcelainized aluminum, or leatherette aluminum finish. Included are such items as Fenestra's movable 2-hour fire partition. Length of sections is up to 31 feet. Includes specifications and construction details. *Fenestra, Inc.*



#### 462—Rolling Doors

Bulletin 96, 24-pages, is a complete catalog of the many types of doors made by Kinnear. It gives information on the types of operation, both manual and electrical; elevation drawings; mounting methods for various applications and locations; specifications; and explains special construction features. *The Kinnear Mfg. Co.*



#### 463—Industrial and Hangar Doors

16-page catalog covers the various types of doors manufactured and installed for industrial building and aircraft hangar installations. Included are canopy type, motorized slide, turnover, and vertical lift doors. Doors such as for crane entrances and the "Byrnaperture" for hangars are also described and illustrated. *Byrne Doors, Inc.*



#### 464—Calculator

AA Wire Products Co. is offering a combination take off rule and a concrete block and Blok-Lok calculator. One side is a handy seven inch,  $\frac{1}{4}$ " and  $\frac{1}{8}$ " scale. The other a handy calculator for fast estimates of concrete block and Blok-Lok requirements. Scale tells how many blocks are needed for any size wall. *AA Wire Products Co.*



#### 465—Wire Rope

This 86-page Catalog, "American Tiger Brand Wire Rope," gives directions for the handling and care of wire rope. Catalog is fully illustrated with dimension drawings, and complete tables of dimensions are included for every type. Specifications also are given in this color catalog. *American Steel and Wire Div., United States Steel Corp.*



#### 466—Construction Handbook

"Construction Data Handbook," 152-pages, covers materials for building construction and maintenance, the information contained in this book is correct in every respect. Concrete and mortar mixes shown are standards commonly used in the trade. Handy tables and charts included in bulletin. *Sun Chemical Corp., A. C. Horn Companies.*



#### 467—Welded Grating

This eight-page bulletin shows details of new lightweight, extra strong Gold Nugget welded grating suitable for power houses, loading docks, oil refineries, fire escapes, drain grates, and all types of heavy duty platforms. General engineering data, safe loading tables, and directions for specifying welded grating are given. *The Globe Co.*



#### 468—Acoustical and Troffer Forms

New catalog AT-58 gives installation data and detail drawings for use of acoustical and troffer forms for concrete joist and slab construction with acoustical ceilings and recessed lighting. Saves time, materials, and labor costs. Produces an attractive and very practical acoustical ceiling. Specifications; dimensions. *The R. C. Mahon Co.*



#### 469—Grating Flooring and Treads

General grating catalog F-400 contains illustrations, descriptions, and complete engineering data on grating flooring, treads, and floor armoring (riveted, press-locked, and welded types). Irving Grating is safe, durable, fireproof, ventilating, clean, and economical for industrial and power plants and stairways. *Irving Subway Grating Co., Inc.*



#### 470—Asbestos Cement Sheets

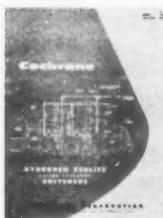
6-page foldout file No. 12-F-1-2, Transite Asbestos Cement Sheets, gives advantages of Johns-Manville industrial structural sheet material. "Transite" needs no maintenance, resists moisture, heat, and corrosion. Strong and attractive plus being simple to use. File lists properties of both flat and corrugated material. *Johns-Manville.*

## WATER TREATMENT AND WASTE DISPOSAL



### 471—Water Supply

Twenty-page booklet entitled "Supplying Water" describes the unique Ranney methods of supplying more clear water to industry and municipalities. Valuable information is included on horizontal collectors, infiltration galleries, vertube wells, Ranney intakes, and new dewatering process. *Ranney Method Water Supplies, Inc.*



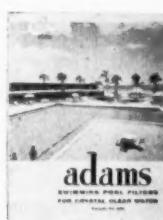
### 477—Hydrogen Zeolite Softeners

New eight-page Bulletin, No. 4530-A, covers the hydrogen zeolite process. Bulletin indicates advantages of the process, its chemistry and variations in methods for neutralizing mineral acidity of hydrogen zeolite effluent. Types of zeolites plus relative advantages and disadvantages of various regenerants are discussed. *Cochrane Corp.*



### 472—Liquid Mixers

A new five page bulletin describing the GFC line of liquid mixing equipment. Important design data, illustrations, and descriptions should be valuable to engineers. Bulletin completely gives details for "FM" type liquid mixers. Bulletin is a must for your files. Write for bulletin No. 5782. Completely illustrated. *General Filter Co.*



### 478—Pool Filters

New 24-page technical bulletin for architects and consulting engineers on swimming pool filters for municipal, public and institutional pools. Contains typical installations, cross-section and operational drawings, charts and factual comparison. This manufacturer does not offer a filter for backyard type pools. *R. P. Adams Company, Inc.*



### 473—Water Program

Consulting Service, Bulletin 5006-A, presents briefly a complete water conditioning and control program that can be tailored to the needs of any users, large or small. How the program works is described and pictured in the 8-page booklet. Bulletin also tells the needs for proper water treatment. *Dearborn Chemical Company.*



### 479—De-Ionizers

Highly purified water can be obtained "on tap" with these units. They are actually small ion-exchange columns, arranged to be placed wherever convenient. All ionizable solids are removed from the water, including silica and CO<sub>2</sub>. Capacities range from 5 to 30 gph, 450 to 1500 grains as CaCO<sub>3</sub>. New. *Illinois Water Treatment Co.*



### 474—Mixed-Bed Deionizers

Bulletin 512 describes single-column mixed-bed deionizers that deliver high quality water, free from all ionizable impurities including CO<sub>2</sub> and silica, at much less than distillation or evaporation cost. "Double-Check" design that gives added capacity and prevents loss of ion exchange material is described. *Elgin Softener Corp.*



### 480—Waste Treatment

Bulletin WC-117 describes Graver's complete line of industrial, municipal, and industrial waste treatment equipment. The various processes are discussed and photographs of typical units are shown. Detailed information and bulletins on all Graver products will be furnished upon your request. *Graver Water Conditioning Co.*



### 475—Research Facilities

Bulletin 100, eight pages, pictures Nalco research facilities. Brief descriptions of the areas in which the company conducts research are given with information on the type of specialized studies the Nalco staff is prepared to undertake for the consulting engineer working on industrial projects of various kinds. *National Aluminate Corp.*



### 481—Water Demineralizers

20-page catalog 127A describes and illustrates Barnstead water demineralizers. Catalog illustrates and gives specifications for 2-bed, 4-bed, and mixed-bed Barnstead demineralizers. Includes storage tanks and small units. Gives complete list of firms who are now users of Barnstead demineralizers. *Barnstead Still and Demineralizer Co.*



### 476—Ozone

A brief discussion on the subject of ozone and its application is contained in this 12-page booklet. It deals with the first discoveries of the gas and early experiments in ozone technology. Carries through to today's application in water purification, pharmaceutical wonder drugs, and industrial chemicals production. *The Welsbach Corp.*



### 482—Control Gates

Folder G-12457 deals with gates for efficient, trouble-free water and sewage control. Subjects covered are watertightness, economical selection, fast, easy operation, long service life, and complete line of accessories and related products. Size ranges and pressures are listed. Illustrated. *Armetco Drainage & Metal Products, Inc.*



#### 483—Engineering Manual

Bulletin 1000 is a multi-bulletin, categorized, consulting engineers' manual covering all types of equipment necessary for specifications on water treatment. Descriptive literature, engineering drawings, and specifications are included. Forty separate bulletins, comprising over 100 pages, cover all equipment. Dearborn Chemical Co.



#### 484—Incinerators

"Dravo Continuous Flow Incinerators," bulletin 1506, describes generally the Dravo incineration plant as a complete process, including everything from the receiving system to the discharge stack. Plants are designed for handling burnable refuse at rates from 3 to 40 tons per hour without odor and smoke. Dravo Corp.



#### 485—Sewage Ejectors

The Blackburn-Smith pneumatic sewage ejector system utilized for elevation of sewage from low points to main higher sewer lines is described in bulletin S-55. Available are single and twin units, in cast iron or welded steel, sizes 30 to 500 gpm, heads to 150 feet. Blackburn-Smith Mfg. Co., Div. of Condenser Service & Engineering Co., Inc.



#### 486—Wood Storage Tanks

Bulletin 53 deals with various types of wood tanks and accessories for chemical processing, water storage, water treatment, and waste disposal. Bulletin 18 describes round tanks, frost proof pipe boxing, rectangular tanks, and tanks for sprinkler systems, etc. For economy and satisfactory performance use wood. Wendnagel and Co., Inc.



#### 487—Demineralizing Handbook

Publication 5800, "Cochrane Handbook on Demineralizing," goes into a detailed description of the demineralizing process and various applications in efficient removal of silica. Flow diagrams and photographs of several types of installations are included to show how this equipment can serve your client. Cochrane Corp.



#### 488—Water Conditioning

Bulletin 611C, 20 pages, describes various equipment employed to condition water for boiler, process, and general uses. It features zeolite water softeners of manual and automatic types, and describes mixed-bed and multi-column deionizers, dealkalizers, ion exchangers, filters, purifiers, and water treating chemicals. Elgin Softener Corp.



#### 489—IonXchange Resins

Bulletin NR describes nuclear grade and technical grade IonXchange resins. Specifications are given for various fully regenerated resins now available for research and process applications. For engineers concerned with design of nuclear reactors and with chemical processes utilizing ion exchange. New. Illinois Water Treatment Co.



#### 490—Water Stills

Barnstead water stills with capacities of  $\frac{1}{2}$  to 1000 gallons per hour, used in laboratories and in industry, are described and illustrated in 49-page catalog "G." Catalog explains in 8 steps, with cutaway views, how a Barnstead still operates. Dimensions and specifications are also given in catalog. Barnstead Still and Demineralizer Co.



#### 491—Ion Exchangers

60-page manual explains ion exchange water conditioning processes, the resins and equipment used, quality of water produced, and typical costs involved. Designed as a practical handbook to aid engineers in proper selection and operation of ion exchange units in water conditioning applications. Illustrated. National Aluminate Corp.



#### 492—Ozonators

Booklet consists of a general discussion of industrial ozonators and the features and operating characteristics that make the unit practical. Included are standard sizes and capacities, typical flow diagrams, approximate cost, and data on needed auxiliaries. Also featured is a description of the new ozone meter. The Welsbach Corp.



#### 493—Diatomaceous Filters

Catalog 356 describes advantages, lists specifications, and explains operation of the famous "Filtermaster" line of diatomaceous-earth type swimming pool filters. Four basic units, two available in portable models, filter from 1800 to 18,000 gallons per hour—with multiple units available for any capacity. Hopkins Equipment Co.



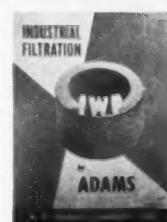
#### 494—Water Softeners

Engineers will be interested in this new 12-page softener bulletin and will want one for their own use. It is well illustrated and contains data and capacities of softening equipment. Bulletin features "CR" Zeolite softeners. Free on request. Bulletin is completely illustrated throughout. Bulletin No. 5783. General Filter Co.



#### 495—Anodes

Duriron and Durichlor anodes for fresh water, ground bed, and salt water applications are described in eight-page bulletin Da/1b. Duriron and Durichlor are high silicon, cast iron alloys possessing almost complete resistance to industrial corrosive materials. Design features, composition, and properties are detailed. The Duriron Co., Inc.



#### 496—Industrial Filtration

How industrial filters lower production costs is explained in ten-page bulletin 651. Data on the new line of IWF filters include sectional views, typical installation drawings, dimension charts, and operational diagrams. Case histories of city water filtration and filtering of re-circulation water are cited and illustrated. R. P. Adams Co., Inc.

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